CAHOKIA'S ORIGINS:
RELIGION, COMPLEXITY AND RIDGE-TOP MORTUARIES IN THE MISSISSIPPI RIVER VALLEY

BY

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DISSERTATION

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ABSTRACT

This dissertation contextualizes religion and complexity as it influenced the emergence of the city of Cahokia through an exploration of ridge-top mortuary practices across the three precincts of Cahokia, East St. Louis and St. Louis ca. AD 1050-1200. Through the theoretical lens of relational ontology and 'New Animism' I investigate how Cahokia's emergence was intrinsically tied to the practice of a new religion. Rather than focusing on religion as a product of the evolutionary development of Native American persons in North America, this study examines religion as a complexity of practices, beliefs, and places bundled with Cahokia's emergence (*sensu* Pauketat 2013a). It is proposed that this religion was not a monolithic or static entity, but rather that religion was a dynamic lived component of Cahokia's beginnings.

In this study both the macro and micro scales of Cahokian mortuary practice, as an extension of religious belief, will be addressed. The aboriginal transformation of the natural landscape into a built space that foregrounds ridge-top mortuaries, associated mortuary features and the burial of the dead are explored as relational components of a new Cahokian religion. In particular, the orientation and alignment of the precinct of Downtown Cahokia will be re-analyzed with a specific focus on Cahokia's orientation as it relates to the location of the newly discovered and excavated Rattlesnake Causeway and the ridge-top mounds located along the site axes. In addition to these lines of evidence this study also presents new data from the previous excavations conducted by Preston Holder at the small ridge-top Wilson Mound, as well as a complete analysis of the human remains excavated from this small mortuary. Through this skeletal analysis I present data on the ways Cahokians, at Wilson Mound, processed and buried human remains. I explore the process of disarticulation and the importance of the curation of the human body prior to burial. Significantly, new radiocarbon dates from both Wilson Mound and the Rattlesnake Causeway are presented providing a chronology of ridge-top mound

construction and use that begins with the early Lohmann phase. Where other scholars examined ridge-tops as isolated, elite, and singular mortuary events, this analysis focuses on the relationships among these novel mounds as well as the relationships of these mounds to Cahokia's emergence.

In addition to the new data presented from Wilson Mound, Rattlesnake Mound, and the Rattlesnake Causeway this dissertation also rigorously re-analyzes previous excavations of the ridge-tops Powell, Big Mound, Cemetery Mound, Mitchell Mound, and Mound 72. This reanalysis serves to contextualize ridge-top mortuary practice across the precincts of Cahokia emphasizing the practices of mound construction and burial of the dead shared across all of these mounds. I also consider the slight deviations present at each mound, emphasizing the important historical and relational qualities of ridge-top mound construction and use.

Ultimately this dissertation conveys a new picture of Cahokia's beginnings, one that focuses on religion and complexity from a perspective that looks to the interconnectedness of landscape, practices and beliefs. This study relies heavily on deciphering the early landscape of Cahokia, how it was built, what occurred in those spaces, and how the creation of those places also created a new Cahokia.

To my parents

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CHAPTER 1

INTRODUCTION

"The spirit of place is embedded deeply within us; we are connected to something larger than ourselves."

- Johnpaul Jones, 2008

The role of religion in the emergence of complex societies is often dismissed as a superfluous or unnecessary line of inquiry in archaeology, one unattainable for societies without a written language or decipherable iconography (see Chapter 3). When the topic of religion is addressed, it is often discussed as a monolithic and structuring system of beliefs observable materially as a set of unique ritual practices, monumental architecture, and special-use buildings or places (see Fogelin 2007 for example). Rarely is religion considered as a relational, generative, and dynamic process entangled with politics, social change, and every-day practice (with the exception of a few studies, see Chapter 3). With this is mind, through my excavation and analysis of two ridge-top mortuary mounds, skeletal analysis of human remains from Wilson Mound, and my excavation and analysis of the Rattlesnake Causeway I reconsider religion at Cahokia as a complexity of beliefs and practices identifiable in relationships among living persons and the dead, the modification of natural and built landscapes, and as foundational to the emergence of the largest Mississippian city in the Eastern Woodlands, when compared to sites like Etowah in Georgia, Moundville in Alabama, and Angel Mounds in Indiana. I argue that through these relationships religion, and the practicing of it, can become constitutive of cultural and sociopolitical change (see Janusek 2006).

In this dissertation, I contextualize religion within Mississippian mortuary space, which includes ridge-top burial mounds, human burials, and a raised, central earthen causeway. Building on seminal studies of ridge-top mounds, I explore how ridge-top mortuary space 'fit' within the Cahokian community, considering the possible active role of ridge-tops (and associated practices, bodies, materials, and earthen soils) in constructing the emergence of Cahokia ca. AD 1050 (see for review Demel and Hall 1998; Pauketat 2010). Questions regarding the role of ridge-top mortuary mounds, these elongated mounds of earth with a peaked summit, have consistently emphasized the economic, political, functional, and ritual/cosmological roles of these mounds (see Brown 1995, 1997, 2003, 2010; Fowler 1997; Goldstein 2000; Porubcan 2000; see also Pauketat 2010). Often such studies choose to examine ridge-top mounds as separate mortuary events, considering the associated burial activities as a product of Cahokia's emergence and a political tool that served to mark site boundaries and to bury the Cahokian elite (see for example Brown 2010; Fowler et al. 1999). Ridge-tops were characterized as anomalies, and in addition, anomalies that could not readily be interpreted due to a lack of archaeological evidence (with the exception of Mound 72) regarding chronological affiliation, method of construction, and their relationship to human remains. Mound 72, the only such mound to be excavated and documented extensively prior to this dissertation (see Fowler et al. 1999), became the 'catch-all' ridge-top, one used to explain Cahokia's religious/ritual practice and hierarchical organization as it related to ethnohistorically documented mythologies and mortuary practices amongst Siouan speaking groups (see Brown 1997, 2003; Goldstein 2000; Milner 1984; Porubcan 2000).

Since this seminal work at Mound 72, ridge-tops have remained on the periphery of Cahokian research cited mostly to discuss ritual practices, hierarchical organization, sacrifice, and sometimes trade (see Brown 1995, 1997, 2003, 2010; Fowler 1997; Goldstein 2000; Porubcan 2000; see also Pauketat 2010 for comparison). Such studies have yet to fully contextualize ridge-top mounds and associated practices within Cahokia's history and further, within Native American religious belief and practice. I present a different approach to the topic of ridge-top mounds and practices, one that considers them within the broader social and monumental contexts of the city of Cahokia focusing on the relationships between religious practice, belief, landscape studies, and mortuary processes as they are *generative of cultural change* (*sensu* Pauketat 2010; see also Janusek 2006). Where others have examined these monuments as singular, monumental constructions, and a *product* of the emergence of Cahokia, I focus on the role of these mounds in the *creation* of Cahokia as part of new religious practice and movement that, in a way, revived mortuary and mound building practices possibly with origins in the Hopewell phenomenon of the Eastern Woodlands. This is a perspective that engages with the *longue durée*, focusing on how practices of community layout, organization, mound building, and burial of the dead are all based in a deep history of relationships with the land. This will be explored specifically at the site of Rattlesnake Mound, where Cahokians revisited this space to construct a new building that simultaneously reinterpreted religious belief and practice by re-orienting space, while maintaining similar burial practices. In addition, the sequence of events at Wilson Mound, Mound 72, and Powell Mound also highlight this historical knowledge addressing details of events and construction while engaging with the temporality of these spaces in relation to one another and to other mounds, plaza, and neighborhood construction events at Cahokia.

Specifically, I am concerned with the location, chronological sequence, and construction of Cahokia's ridge-top mortuary mounds and the affiliated Rattlesnake Causeway. Earlier interpretations of these monuments and mortuary landscapes as elite burial grounds or mass graves for whole lineages, as monumental sign posts delineating the edges of the Cahokian community, or as collective representation and cosmological tableaus, have yet to account for the diversity of practice and the deep historical ties of these mounds to the emergence of Cahokia (see Brown 1995, 1997, 2003, 2010; Fowler 1997; Goldstein 2000; Porubcan 2000; see also Pauketat 2010). Studying ridge-top mounds as isolated entities constructed for the sole purpose of burying the dead or to examine these mounds as just marking Cahokia's boundaries may ignore the role of ridge-tops as sites embedded in a complex history.

Additionally, an archaeological analysis of these monuments must consider Native American histories and beliefs; the study of Native American mortuary practice and human remains is a tenuous and complicated process that must employ a perspective that moves beyond colonial discourse to actively incorporate Native American ontology but not just in the form of ethnographic analogy. Ontological approaches require rigorous archaeological research combined with a theoretical perspective that considers the relational aspects of practice and belief as they are related to being-in-the-world (see Ingold 2013). This perspective allows for the consideration that Cahokian ridge-tops were intentionally built to fulfill multiple purposes and to affect and to create the knowable and experiential world. I explore this further in the discussion of the Rattlesnake Causeway, for one, which indicates that ridge-top mounds were not strictly isolated spaces but were actively incorporated into the organizational plan of Cahokia tying together seemingly disparate locals with the central core of the site. It is when we look at the macro-scale relationships among ridge-tops, the causeway, and the broader Cahokia precinct that we begin to see patterns of landscape use emerge.

Patterns of shared practices, methods of mound construction, and location of ridge-top mounds suggest that Cahokia's emergence was intimately tied to the introduction and traditions of a *new religion*. I use the words *new* and *religion* to identify such practices unique to the city of Cahokia; not that the religious beliefs or practices were new as it can be argued that such traditions existed prior to Cahokia with roots in the Hopewell and possibly the Archaic period, so much as the *scale of practice*, associated monuments and materials identified archaeologically at Cahokia, were unique to the Mississippian period (AD 1050-1300). Such changes to the landscape in the middle of the American midcontinent, particular to the region surrounding a stretch of floodplain locally known as the American Bottom, at AD 1050 introduced new ways of being and doing to the Late Woodland horticulturalists living in the area significantly altering the daily lived experience (Pauketat 2013a, 1994; see also Alt 2002, 2010; Emerson 1997; Kelly 1990). These changes, I argue, were intentional and purposeful, rather than environmental or evolutionary, and reconfigured the way people experienced and lived as well as drastically re-shaped the natural and historically occupied landscape. I am not the first to argue that such changes were due in part to the introduction of a new religion (Brown 1997, 2003; Emerson et al. 2008; Hall 1997, 2000; Pauketat and Emerson 1991; Pauketat 2013a), but what I will do is suggest that this new religion, via ridge-top mounds and associated spaces, practices and events, were catalysts to the city's emergence. As such I do not intend to suggest that prior to Cahokia, Late Woodland, Hopewell and Archaic period communities did not 'have religion', as much as one can *have* something that is ever changing and ethereal, but rather that the practices and landscapes intimately tied to such religious beliefs were strikingly distinct both in scale and tradition at Cahokia, and were potentially part of a revitalization of previous mortuary practices, beliefs and mound construction with roots in the Hopewell period (see Hallowell 1960; Pauketat 2013a; see also Brown 1997; Emerson et al. 2008).

Although Cahokia, the city, is a uniquely large and complex community unlike anything before or after it, it is also a revitalization of practices tied to the land; practices that have historical ties to the Archaic period site of Poverty Point and Hopewell-period mounds and earthworks (see Kidder 2010). From an historical perspective, relational ontology is a way of experiencing, navigating, and understanding a multi-scalar world with infinite relationships (see Harvey 2006a; see also Alberti and Marshall 2009). It is this recognition of various relationships that creates a multi-dimensional reality engaging with the places and persons in the present but also with different temporalities, different scales, and different histories as identifiable, in this context, through the built landscape.

Relational ontology, as one way of viewing and engaging with the world, draws upon histories. I explore this concept particularly through an investigation of the way Native Cahokians construct the built landscape, especially in the physical citations and revisiting of past practice and past knowledge. For example, I explore ridge-top mound construction through the revisiting of spaces through excavation and re-burial of human remains. In these contexts the living interacted with the past, re-discovering mound construction processes and events as well as engaging with historical ancestors. In particular, the late addition mortuary building at Rattlesnake Mound potentially cited past practices like those performed at Wilson Mound, Mound 72, and Powell Mound, but also created a new way of relating to mortuary space that required the reconfiguration of building orientations and the associated dead (see Chapter 5). In this way, the processes of relating to the natural and social environments, to persons, and to places is historical as well as generative of social change.

The social change occurs in how people choose to re-invent such past practices. Using Hopewell as an example, Hopewellian persons constructed large earthen mounds and also employed celestial alignments to organize their built landscape (see Lepper et al. 2004; Romain and Burks 2008; Van Nest et al. 2001). This knowledge can also be traced back to the Archaic period and Poverty Point where similar processes of moving earth to build large mounds was also employed (see Kidder 2010). From the Archaic period to Hopewell to Cahokia we see a re-invention of mound construction and earth moving as well as aligning those mounds to specific celestial bodies. At each iteration of this practice there are changes in execution that include the construction of effigy mounds (Archaic and Hopewell), the addition of multiple mounds in specific organizational patterns (Hopewell and Cahokia), the burial of multiple persons in those mounds (Cahokia and Hopewell), and the arrangement of those mounds into a sprawling city (Cahokia). The relationships that characterize those processes are at once embedded in an historical knowledge and a relational understanding of the world; and importantly are also generative of social changes that influenced the emergence of communities like Cahokia or the pilgrimage of people to the Hopewell period site of Newark, for example.

Prior to examining the various manifestations of religion in practice, monument construction, and land modification one must deconstruct the term religion itself, "and rather than assuming that the category *has* content and seeking to specify what that content is the concept of religion as we understand it (and hence tend to define it) is a by-product of the special historical and political circumstances of Western modernity" (Arnal and McCutcheon 2013: 28, emphasis original). As such, we cannot move forward with unpacking the relationships between religion, practice, landscape, and the emergence of Cahokia without first examining the concept of religion, its many iterations, and its current use throughout this dissertation. Chapter 3 deals with this very issue, thinking through the historical context of religion as a concept, and if and how this can be useful when examining Native American ontological beliefs.

In addition to religion from an ontological perspective, I am primarily concerned with landscape, the history of place, the physical construction of the built environment and what people do with and in such spaces (see Ashmore and Knapp 1999; Tilley 1994; Tuan 2001). I argue, following others, that Cahokia was not only a planned city built for economic and political purposes but also that it was a spiritual place, one related to ancestors, gods, and the cosmos *through the land*. As Vine Deloria Jr. (2003: 292) states, "…peoples and lands can relate to each other in a very powerful manner to develop a spiritual unity…[and] [o]nce developing roots as did the Five Nations at the Great Tree of Peace at Onondaga, the land and the religion apparently become as one." I argue that the Cahokian landscape is intimately tied if not subsumed by religion, and by this I mean that one could not separate the growing of maize from the Mother Earth, or the construction of a mound from engaging with the known creation-histories of the lived-in world (see Deloria 2003; Echo-Hawk Jr. 2009; Hall 1997; Hallowell 1960; Ingold 2014). These relationships are important to understanding a past ontologically different than Western perspectives where the land is not just something to be acted upon but rather is an actor(s) itself.

Through a perspective that builds upon theories of bundling (Pauketat 2013a; see also Ingold 2007, 1993; Latour 2005), relational ontologies (Alberti and Marshal 2009; Alberti and Bray 2009; Zedeño 2009, 2008), and archaeologies of 'doings' (Fowles 2013) I argue that Cahokia's religion was comprised of multi-temporal and multidimensional practices emphasizing relationships with the dead bundled in ridge-top mortuary mounds and the constructed landscape of Cahokia. As Pauketat states (2013a: 6) "A scientific study of religion…attempts to understand how religion– as performed in the open, practiced on the landscape, and experienced in and through things, elements, and substances– was related to human history"; and by investigating the dynamics of Cahokian mortuary practice I hope to do just that.

I also explore complexity and what it means to be a 'complex society'. Additionally, this study examines how social/political complexities and religion, in the case of Cahokia, are not mutually exclusive concepts. Just as the Catholic Church held influence over political leaders in medieval Europe, Cahokian leaders may have shared a similar experience; one that focused on the interrelatedness of politics, religious belief, and the manifestation of those beliefs in the buildings and monuments that constructed their city. I reevaluate the traditional notions of political power and religion by focusing not on leaders, ritual, and control, but rather on relationships, networks, and 'doings' (Alberti and Marshal 2009; Alberti and Bray 2009; Zedeño

2009, 2008; Fowles 2013; Ingold 2007; Latour 2005; Pauketat 2013a). Specifically, Vine Deloria Jr. (2003: 65-66) states:

> The structure of their [American Indian] religious traditions is taken directly from the world around them, from their relationships with other forms of life. Context is therefore all-important for both practice and the understanding of reality. The places where revelations were experienced were remembered and set aside as *locations where, through rituals and ceremonials, the people could once again communicate with the spirits*…It was not what people believed to be true that was important but *what they experienced as true* (emphasis mine).

This quote emphasizes the importance of the land, the possible reasons behind the desire to construct such a place as Cahokia; reasons citing the "permanency and rootedness that the Indian sacred places represent" switching the structure of religious reality from "a temporal scale to a spatial framework" where the focus is not on the western or Christian method of preaching belief, but rather on a community of relationships with place, material, people, and the cosmos at the center (Deloria 2003: 67).

Additionally, I demonstrate that ridge-top mounds were some of the first monuments constructed at the site of Cahokia (ca. AD 1050-1100), and that their presence was maintained to the end of the Stirling phase (ca. AD 1200); establishing this chronology is important when thinking through Cahokia's emergence because it indicates that there was a broader plan involved in the city's construction- one that included building ridge-top mortuary mounds and organizing Cahokia's landscape with these mounds and spaces in mind. Typically, scholars look to the construction of Monks Mound and the Grand Plaza as the important building projects and the first to take place at Cahokia (Alt et al. 2010; Dalan et al. 2003; Schilling 2012, 2013). Lacking data on mound construction, especially ridge-tops, makes an assessment of temporal affiliation difficult, but for the most part archaeologists seemingly neglected the available data on construction and use of ridge-top mounds and the causeway resulting in their elimination from the 'big picture' of Cahokia's emergence. With the exception of Mound 72, mounds like Powell, Wilson and Rattlesnake were part of isolated discussions relegated to references in reports or book chapters that focused on the specific details of burial (where possible) and function, their locations on Cahokia's edges, and their likely utility as marker mounds. Besides inventories by Fowler (1997), Kelly (1994), and Pauketat (2010), these monuments have yet to be considered as an integrated and important, if not crucial part of Cahokia's emergence.

Chapters 4, 5, 6 and 7 address such chronological questions placing ridge-top monuments directly into discussions of Cahokia's emergence, history and landscape modification. I present my new data on the previously underreported excavation of Wilson Mound, a small ridge-top located between the precincts of East St. Louis and Cahokia, that includes a detailed discussion of construction methods and temporal sequences as well as a detailed analysis of the human remains excavated from this burial mound. Additionally, I present my new data on the construction methods of Rattlesnake Mound and the presence of a previously unidentified mortuary building identified at the base of this monument. I also compare these two ridge-tops with data collected from excavations into Powell Mound-located on Cahokia's western boundary- Mound 72, Mound 49-both small ridge-tops located in Cahokia's central precinct- the Big Mound (St. Louis precinct), the Cemetery Mound (East St. Louis precinct) and the Mitchell Mound located at the Mitchell site northeast of Cahokia. Through this comparison, I argue that Cahokian ridge-top mounds followed a shared pattern of construction and use. I also identify that construction on these mounds *began* between AD 1050-1100 furthering the argument that ridge-tops were a significant and planned part of Cahokia's early 50 years. Additionally, I present my evidence for a new piece of Cahokia's landscape, the Rattlesnake Causeway, which I argue was yet another foundational monument of Cahokia- one constructed early on setting up Cahokia's 5^{o} offset grid, and built in concordance with the construction of the first terrace of Monks Mound, the Grand Plaza, and Rattlesnake

Mound (see Baires 2014; Emerson and Farkas 2011; Norris P.C. 2012; Pauketat et al. 2013; Romain *in press*).

Throughout this dissertation I focus on how the practice of a religion based in mortuary processes, mound construction and landscape modification helped to establish Cahokia, both physically and spiritually. My goal is to convince the reader that Cahokia was more than a central mound and plaza configuration focused on political leaders, trade, and commerce, but rather that this massive city was constructed and experienced as part of a unique network of religious beliefs and practices, place, death, and ancestors all bundled together (*sensu* Pauketat 2013a) in the American Bottom of what is now southwestern Illinois.

CHAPTER 2

CAHOKIA: Natural and Built Landscapes

In the following, I define Cahokia's natural and built landscapes focusing particularly on physiographic environments, landscape modification, and the organization of the city of Cahokia with respect to the three precincts of Cahokia, St. Louis, and East St. Louis, as well as to the surrounding small farming communities and Cahokian outposts located in the uplands of Illinois. Specifically, I address Cahokia's community layout, considering the location of ridge-top mortuary mounds in relation to the established organizational grid of the site, other earthen mounds, neighborhoods, and plaza complexes. Beginning with a discussion of how this city was built, I keep in mind the relationships among ridge-top mounds, landscape modification and burial practices to Cahokia's emergence in the American Bottom floodplain of southwestern Illinois.

As stated in Chapter 1, the land is an important factor in this dissertation as it is a malleable and relational foundation of religious belief and practice (see Deloria 2003). I explore landscapes (both built and natural) as relational and active, considering how and why native Cahokians chose to construct their city specifically in the American Bottom floodplain (see Tilley 1997; Zedeño 2009). As Janusek (2006: 470) argues, the landscape can become a "prominent…feature, [with] vital natural elements and recurring celestial cycles" that have the potential to shape histories and impact experiences. Additionally, the Osage (according to La Flesche [1932: 31]) considered the landscape to house the all-pervasive power Wa-kon-da, this power "resides in the air, the blue sky, the clouds, the stars, the sun, the moon and the earth [as well as] all living and moving things" (La Flesche 1932:31). Wa-kon-da is at once one God, but also prescenced in *everything,* and the Osage consider their cosmos as consisting of relationships among the sky, the living world and the earth. I cite the Osage (a Dhegiha Siouan tribe) in particular because their territory (during European conquest and colonialism, 1690) was located nearest to Cahokia, in contemporary southwestern Missouri near the Osage River (La Flesche 1932: 28). Although the location of the Osage alone does not mean they were descendants of Cahokians, it does provide a context within which to explore such indigenous understandings of the physical and cosmological world as it might have been experienced at Cahokia. Through a consideration of both the natural and built landscapes of the city of Cahokia I explore the relationality of the land, as it was the foundation of indigenous religious experience.

Today, when walking through the remains of the Cahokia Precinct, I am often struck by the 'sunken-in' quality of the natural landscape. It feels low and swampy, often with shallow pools of standing water collected in small crevices or depressions in the land. Depending on the season and time of day, steam and fog can be seen hovering low to the ground. Deer are often visible grazing near the tree lines or in open spaces, and water birds can be seen floating and standing in water-filled borrow pits. While walking through Cahokia, tall prairie grasses, poison ivy, and other plants cover the open spaces not regularly mowed by State Park officials. Trails are cut through these spaces, creating pathways that take you to rarely visited parts of the site. One can imagine these areas covered in small semi-subterranean houses, plazas, public and special-use buildings as well as causeways and pathways maintained by Cahokia's inhabitants. The flat, ridge and swale floodplain is/was a place of history with occupations from the Terminal Late Woodland period present on the landscape ca. 900-1050 AD. These neighborhoods and the surrounding floodplain environment would be transformed into a new city that cites the powers of Wa-kon-da, the cosmos, and the earthly realm.

Although expansive views are blocked today by modern neighborhoods, strip malls, railroads and dumpsites you are aware that the Mississippi River is located to the east and that

St. Louis is not far away. In fact, if one climbs to the top of Monks Mound, St. Louis becomes visible in the hazy distance, just beyond the city dump, as a line of buildings and highways marking the location of another formidable Mississippian period site, the St. Louis Mound Group. The Mississippian site of East St. Louis is also noticeable from this vantage point and together these three precincts (Cahokia, East St. Louis, and St. Louis) transformed that natural floodplain into a bustling metropolis that occupied the area from AD 1050-1350. It is this relationship between the natural and built landscapes that provided a unique context for Cahokia, the city, to be created. The following descriptions of the natural landscape foreground the relationality of this environment as one that consisted of secondary forces with their "own unique set of qualities or characteristics that give...real or potential" value to humans (La Flesche 1932: 32). Such environments encompass suites of powers that can sustain (e.g. food resources) or destroy life (e.g. birds of prey). These powers are recognizable in the stands of trees, the water-filled depressions, the open flat spaces, and the animals that occupy this landscape.

Natural Landscape and Environment

The city of Cahokia convenes with the natural topography in the southwestern portion of present day Illinois in the wide expanse of the Mississippi River floodplain that begins at the confluence of the Illinois and Missouri Rivers with the Mississippi (Figure 2.1). The American Bottom is the area of the Mississippi River floodplain from Alton, Illinois (near the mouth of the Missouri River) southward toward the town of Chester, Illinois (just below the mouth of the Kaskaskia River) (Fowler 1997). This area was named as such "because the most intensive settlement there had been by Americans after the Revolutionary War" (Fowler 1997: 4). Characterized by two major physiographic zones, the American Bottom, includes the floodplain and the uplands each of which are home to distinct resources that include rich, fertile soils perfect for farming, and oak-hickory forests, prairie, streams and creeks (Table 2.1) (Betzenhauser 2011; Fowler 1975, 1997; Milner 1998; Pauketat 2013b; Welch 1975).

The American Bottom floodplain was initially formed by "the erosional action of glacial torrents thousands of years ago" and, due to the movement of the Mississippi River over time, this area became dotted with abandoned river channels, oxbow lakes, marshes, swales, and tributary streams that regularly absorbed floodwaters (Fowler 1997: 4). The resultant environment was ideal for farming and consisted of flood-deposited sands and silts, clays, marshy swales and dryer ridges. Additionally, such alluvial clays were ideal for mound construction and pottery production. Within the floodplain itself lithic resources were limited and consisted of chert and igneous cobbles transported by rivers and streams (Betzenhauser 2011; Pauketat 2004, 2013b). These same areas also consist of a variety of large and small mammals, rodents, migratory birds, fish, mussels and turtles as well as naturally growing harvestable plants. Mammals exploited for food resources commonly found in Cahokian faunal assemblages include white-tailed deer, elk, dog, raccoon, rabbit, and squirrel (Miracle 1998; Parker and Scott 2007). Birds include duck, goose, killdeer, turkey and swan, and fish types include bass and catfish (Miracle 1998) (see Table 2.1).

Important to the topic of the relationality of the natural landscape and the construction of Cahokia is the recognition that this city was intentionally built in a swampy, marshy, wet area. Charles Dickens (1987[1842]: 220-222) described the American Bottom as consisting of "one unbroken slough of black mud and water [with] no variety but in depth." Dickens further noted the consistent presence of stagnant floodwaters un-drained from the swampy areas of the land, which indicated that this area was consistently inundated, at some level, with water. Due to the meandering course of the Mississippi, the river carved out ridges and swales providing relatively high points that consisted of silty to sandy soils and clay soils in the low swales with floodwaters consistently filling in low areas and creating swampy ponds that dotted the Cahokian landscape (Milner 1998).

Water is an important, if not crucial, part of the Cahokia Precinct's natural landscape. Echo-Hawk Jr. (2009) describes watery places as having the potential to be "holy places" or "powerful places" describing them as 'hierophanies', following Eliade (1987). These holy and powerful places presence Wa-kon-da creating "a wonderous land where everything has a spirit, including the earth, water, and every living thing…"(Echo-Hawk Jr. 2009: 68). For the Osage, water-animals were called upon to help in traversing such waterways. Water bodies like streams, rivers, and lakes occasionally considered dangerous, required permissions and aid from The Great Spirit to cross safely (La Flesche 1932: 203). Watery places are also tied to the underworld and the world of the dead as boundaries that need to be passed through prior to the soul or spirit arriving in the afterlife (Lankford 2007). In addition to bodies of water, marine and fresh-water shells share a similar importance as they have been documented as providing connections between the living and the dead (ancestors). Marine shell in the form of whole shells or beads, importantly, is associated with mortuary contexts and burials potentially tying together the watery underworld with that of the living (see Chapter 6; see also Classen 2011). Water, in its many forms, can embody a multitude of experiences from holy places visited on vision quests (Echo-Hawk Jr. 2009) to dangerous boundaries to be traversed with accompanying guidance and permissions (La Flesche 1932). It is not surprising then, that water was a pervasive part of the Cahokia precinct landscape one that was maintained year-round in water-filled borrow pits, streams, and marshy wetlands.

George Milner (1998: 45) argues that 19 percent of the floodplain in this part of the Mississippi River valley was covered by swamps and lakes. Additionally, 15 percent of the American Bottom was also consistently covered in water. The average annual rainfall for this portion of the American Bottom is 39 inches; but, this has varied between 69 inches in a single year to as little as 23 inches (Welch 1975). In such a wet environment the majority of the surface water evaporates (rather than drained), and particularly during the hot summer months (where temperatures can reach upwards of 103^{o}) creates a steamy and humid environment. When water levels do drop slow, poor drainage meant that low areas continued to contain muddy pools of stagnant waters inundated with marshy vegetation. These areas of standing water teamed with resources that included naturally growing edible plants, waterbirds, and fish making for a fertile if steamy summer landscape (Milner 1998: 44-49).

In addition to the muddy banks of the Mississippi, forests and prairies also blanketed the river valley floor and consisted of a variety of plant life including pioneering trees like willows and cottonwoods (Lopinot 1991; Milner 1998; Welch 1975). These forested areas gave way to prairies the closer one got to the limestone bluff line. "[O]ne of the most extensive prairies was located in the vicinity of the East St. Louis and Cahokia mounds" and has been described as stretching "for miles" covered with flowers and stands of trees (Milner 1998: 51; see also Wild 1841). Such prairies, at least during the early 1800s, consisted of vegetation (grasses) tall enough to "hide horseback riders" (Oliver 1843). Once in the Illinois uplands the land became a combination of prairies and deciduous forests with oaks, elms and hickories most commonly recorded (Milner 1998: 51). This area was fairly flat with a few ridges, streams and creeks, and lithic resources (chert outcrops, glacial till, sandstone and limestone), deer, and nuts present throughout.

Such a landscape was ripe for farming, with the dryer parts of the floodplain and the higher sandier ridges ideal for cultivating crops; the soils drained well and were easier to till with a shell or stone hoe. Maize (*Zea mays*) was an important plant farmed in this area during Cahokia's domination of the valley, in addition to a few Indigenous cultigens including goosefoot

(*Chenopodium brlandieri*), erect knotweed (*Polygonum erectum*), and maygrass (*Phalaris caroliniana*) which produced starchy seeds and were cultivated by early Late Woodland horticulturalists in the area as well as Cahokians (Lopinot 1991, 1994; Johannessn 1984, Parker and Scott 2007; Simon 2002; see also Smith 1989). Maize, however, was the important crop and grown in abundance. Based on stable isotope research, maize was a consistent staple of Cahokian's diets and Ambrose et al. (2003) argue that for lower status female individuals (buried in Mound 72) maize made up approximately 60 percent of their overall diet (see also Buikstra et al. 1994). Maize cobs and kernels are also found archaeologically in domestic buildings and pits (Lopinot 1994; Milner 1998), and depicted in 'Earth Mother' symbolism seen on a flint clay figurine recovered from a small site near Cahokia (Emerson et al. 2003). In addition to maize and Indigenous cultigens other edible plants gathered or cultivated from the surrounding area (identified in the sub-Mound 51 feasting pit) include nuts, bottle gourd, two species of squash, sunflower, grape, persimmon, strawberry, plum, elderberry and mulberry, and nightshade (Pauketat et al. 2002; see also Parker and Scott 2007). The variety of plant species, either farmed or gathered, emphasizes the unique fertility of the American Bottom landscape indicating that this place was important not only for its location near such a major river but also for its bounty. This aspect of the natural environment becomes important when attempting to understand why Cahokians chose to construct such a massive city in a low, marshy area.

In addition to fertile farmlands, the nearby St. François Mountains in the Ozarks of Missouri (within 100 km of Cahokia proper) were abundant in resources acquired by Cahokian people. These included forests of hardwood and softwood, salt, galena, hematite, flintclay, high-grade chert (Burlington), and fine-grained igneous rock (Pauketat 2004: 31-32; see also Emerson et al. 2003; Kelly 1980). These materials were used to create a wide range of items including tools (celts/axes and grinding stones), pigments, discoidals (chunkey gaming stones) and flintclay figurines (Emerson et al. 2003; Pauketat 2004). Farther afield resources like Mill Creek and Kaolin chert (located in present day Union County) outcrops were sourced for making additional tools (Koldehoff 1995). Cahokians also may have gathered Hixton silicified sediment from west-central Wisconsin, marine shell from the Gulf of Mexico, and copper from Michigan (Emerson and Lewis eds. 2000; Stoltman ed. 1991; see also Fowler et al. 1999).

This diverse natural landscape, Mother Earth, "shape[s] society and nurture[s] the human spirit [and] tells the sacred stories of the birds, animals, plants, and natural phenomena that comprise human habitats" (Echo-Hawk Jr. 2009: 58). Through this perspective, the natural landscape is best understood as an active participant in the construction of Cahokian society. It is not something passively acted upon, but relationally constitutes the human, animal, and spiritual inhabitants of a community. Viewing Cahokia through such a lens reveals a connection to the rest of what is now the Southeastern and Midwestern United States by more than river ways and overland trails (Pauketat 2004, 2013a). Cahokians' had access to unique materials gathered from the Gulf of Mexico, the Ozarks, Wisconsin, and Lake Michigan and their influence can be traced to sites like Spiro in Oklahoma, Etowah in Georgia, and Aztalan and Trempealeau in Wisconsin (see Brown 1971; Fowler et al. 1999; Pauketat et al. 2010). This unique American Bottom landscape became home to one of the most influential cities from the eleventh and twelfth centuries supported by extensive farming, the bounties of the St. François Mountains and the nearby uplands to the east which all embody the presence of Wa-kon-da.

Cahokia's Built Landscape

The built landscape of Cahokia and the natural features of the landscape create a city-space that consists of earthen monuments, plazas, causeways, and households interdigitated with water features, prairies, and the nearby limestone bluffs. Cahokia, the city, consists of three precincts (St. Louis, East St. Louis and Cahokia) stretching from present-day Collinsville, Illinois to East St. Louis, Illinois and across the Mississippi River to St. Louis, Missouri (Figure 2.2, 2.3). These three precincts were roughly contemporaneous (ca. AD 1050-1300) and consisted of a mound and plaza organization. Cahokia—the largest of this complex – "coalesced in short order around a political leader, a religious movement, or a kin-coalition that rapidly centralized social relations and political economy of the American Bottom" (Pauketat 2002: 152; see also 1994). Pauketat's "Big Bang" hypothesis emerged out of a comparative study of excavation results from different Cahokian neighborhoods (Tract 15A, Dunham Tract, ICT-II, Grand Plaza, Mound 72, FAI-270) drawing upon multiple lines of evidence and looking to landscape modification, abandonment of local Terminal Late Woodland (communities of people living in the American Bottom prior to the construction of Cahokia) lifeways, and the influx of immigrant neighborhoods into the surrounding uplands to indicate that Cahokia's emergence was one of rapid and planned change (see also Alt 2002; Pauketat 2002: 153; Pauketat and Alt 2005).

In particular, the American Bottom floodplain landscape was drastically reshaped for the expansive 13 km^2 area of the Cahokia precinct home to approximately 120 earthen mounds in circular/conical, platform, and ridge-top shapes, constructed plazas, neighborhoods, Woodhenge, the Rattlesnake Causeway, and an estimated 10,000-16,000 people who resided in this precinct at Cahokia's peak (Pauketat and Lopinot 1997; Pauketat 2013a, 2013b; see also Dalan et al. 2003; Fowler 1997; Kelly 1994; Milner 1998). The construction of the Cahokia precinct superimposed "the remains of an extensive Terminal Late Woodland-period village… 'Old Cahokia' " abruptly rearranging ways of being for the communities already inhabiting the area (Pauketat 2013a: 17). This change in community organization no doubt had social, political, religious, and cultural effects that not only impacted local Terminal Late Woodland populations but also people in the surrounding outlying areas (Alt 2002, 2006; Betzenhauser 2011; Emerson 1997; Fowler 1997; Pauketat 2004, 2009, 2013a).

For one, these changes are visible in the ways people constructed their homes, which shifted from post-hole to wall-trench building methods; Pauketat and Alt (2005) (see also Alt and Pauketat 2011) argue that this shift in construction style implied a standardization of house building that included pre-fabricated walls and the rapid construction of neighborhoods rigidly aligned to the new Cahokia grid, a five degree offset grid that all mounds, houses, and plazas adhered too. In addition to restructuring neighborhoods and house styles, the introduction of new pottery manufacturing techniques (shell temper) and styles (i.e. Ramey incised) overtook previous methods of pottery construction resulting in new vessel types as well as hybrid forms recovered from immigrant villages and households (see Holley 1989; Pauketat 2002).

Previous interpretations of Cahokia's construction (both the city and the precinct) as a massive undertaking, were previously attributed to aggrandizing elite male(s) whose control over resources and to some extent religious beliefs and practices maintained order and ultimately structured the city's emergence (Anderson 1994; Brown et al. 1990; Knight 1986; Peregrine 1992; see also Pauketat 2013a). But, perhaps most important to this emergence was the re-organization of the TLW period neighborhoods and landscape to a new, rigid city layout aligned to a 5^{o} offset organizational grid. This alignment, I argue (in concordance with Romain 2012, *in press* and Pauketat 2013a), was intentionally set up and marked by the Rattlesnake Causeway, the construction of paired earthen monuments, the construction of ridge-top mounds, and new ways of relating to and burying the dead (Baires 2014; Emerson 1997; Fowler 1997; Kelly 1990; Pauketat 2004, 2009, 2010; Pauketat and Alt 2005; Pauketat and Emerson 1991).

Additionally important to this landscape reorganization was the constant presence of water and marshy wetlands (Figure 2.4). Cahokia, the site, can be divided into "four zones according to susceptibility of floods: permanently wet places…areas submerged by floodwaters three times in the 1850s; land covered by the 1844 flood; the driest parts of the valley floor"(Milner 1998: 45, see also Milner 1998 Figure 2.16). Milner uses the term 'maximum wetlands' to describe "areas with the maximum potential to intercept precipitation and to store water" (Gleason et al. 2007: 3). When looking at Milner's (1998: Figure 2.16; Figure 2.4 this dissertation) map of these flood zones, it becomes apparent that Cahokians intentionally constructed their city into a landscape regularly inundated with water. Some areas, like where Monks Mound, part of the Grand Plaza and Mounds 42 and 41 are located, remain relatively dry as they sit on land higher than the surrounding floodplain; the areas directly south and north of Cahokia's central core, consistently marshy and swampy, were home to neighborhoods, other mounds, and the Rattlesnake Causeway in particular. The area south of the Grand Plaza is one of the lowest in elevation and marshiest landscapes at Cahokia and home to the majority of identified ridge-top mounds (Rattlesnake Mound, Mound 72, Mound 64, Mound 65) (see Fowler 1997; Milner 1998) (Figure 2.5, 2.6).

The estimated total area of Downtown Cahokia (from Monks Mound, south to Rattlesnake Mound) with the potential to be inundated by water during the wettest months of the year (early spring through summer [Milner 1998]) is approximately 100 ha. This number was estimated by overlaying an arbitrary grid, broken down into 200 m^2 blocks, on top of figure 2.5. The likely presence of water was assessed using LiDAR generated elevations and correlating those elevations to Milner's (1998: Figure 2.6) map identifying areas of wetlands (see also Figure 2.4). Elevations between 125.7 m asl and 126.4 m asl correlated to Milner's (1998: 45) areas of land identified as "submerged by floodwaters three times in the 1850s floods." Areas of dense habitation during the Lohmann and Stirling phases (e.g. Tracts 15A and 15B, northern Dunham Tract) range in elevation between 127 m asl and 128 m asl, approximately one to two meters above elevations correlated to areas accessed as at risk for flooding (see Pauketat 1998: Figure

2.1 for contour map of Tracts 15A and the Dunham Tract; Milner 1998). Areas of land more consistently inundated with water remain north of the central portion of the Cahokia precinct and consist of approximately 144 ha of land. The Kunnemann Mound Group marks the boundary between this area of wetlands and the central portion of Cahokia. The relationship between ridge-top mounds and these marshy areas is expanded upon in Chapters 4 and 5, and considers the relational ontological reasons behind building a large mound of earth in a seemingly wet, lowland environment (see Lankford 2007; also Hall 1997).

To control for occasional flooding and to mitigate the otherwise damp environs, Cahokians built up the natural landscape forming high areas of land out of ridges and swales by filling in low-lying areas (see Dalan et al. 2003). Evidence supporting this claim is documented, in particular, at the Grand Plaza- one of the central features of the Cahokia site. The Grand Plaza is an artificially constructed open space covering 19-24 hectares where early Cahokians flattened out and elevated the natural ridge and swale topography and filled in a large pit likely used "to obtain sediments for [the construction of] Monks Mound" (Dalan et al. 2003: 135; see also Alt et al. 2010). Cahokians filled in such areas to result in a final product level, flat, and well drained (Dalan et al. 2003). In addition to the process for filling in the area underlying the Grand Plaza, Cahokians also focused their efforts in utilizing borrow pits for drainage, collecting standing water and runoff from other portions of the site creating artificial lakes (Dalan et al. 2003: 136). Water was an important, if not a central component of Cahokia, taking the form of creeks, marshlands, water-filled borrow pits, and intermittent lakes situated around the known boundaries of the Cahokia precinct (Dalan et al. 2003). Dalan et al. (2003: 91) state:

> The largest area [of Cahokia] is enclosed by the Spring Lake paleomeander. This meander scar forms an eastern boundary that arcs around to the south…Travel within this area would for the most part have been unimpeded. A culturally created series of bodies in the form of open, water-filled borrow pits mirrors the shape of these natural water bodies, forming…a second inner ring bounded by water. In between these two rings lies an expanse of largely unoccupied, low-lying ground.

This landscape provided a unique space for Cahokian's to transform the natural environment into a dynamic area marked by high mounds, man-made lakes, and large areas of inhabitable flat lands. Such malleability, not to mention the closeness to water, was likely one of the most attractive features of this floodplain. Again, Echo-Hawk Jr. (2009) describes the landscapes of North America as instrumental in creating sacred and meaningful place, as well as embodying sites of history. This is particularly exemplified at Cahokia; both in the ways people built their space and reorganized Terminal Late Woodland neighborhoods.

In addition to filling in borrow pits with water and leveling land for plazas, Cahokians also filled in borrow pits with layered soils, such as the Yale Avenue pit adjacent to Mounds 27 and 28 east of Monks Mound (Koldehoff et al. 2000). This borrow pit was intentionally filled during the early Lohmann phase with twenty-one separate fill zones alternating between clays and silty deposits. Koldehoff et al. (2000: 206) argue that this in-filling sequence was part of the construction of another open plaza space located between mounds 28, 27 and 53 and that it happened quickly as there was no evidence of naturally accumulated soil deposits. The combination of the artificially in-filled pit, the early date of this feature, and the association of this pit with an additional constructed plaza provides just one more line of evidence that Cahokians remodeled the natural landscape ca. AD 1050. There is also evidence that Cahokians built up the landscape in a similar manner at the contemporaneous precinct of East St. Louis where builders used "swale fills [as a means to] elevat[e] and level a formerly low-lying area to create an artificial surface"(Pauketat 2005: 312) (explored in more detail below).

Additional evidence for reshaping the landscape is visible in the vicinity of Rattlesnake Mound, located approximately 1 km due south of Monks Mound on the known southern boundary of the Cahokia precinct. Constructed in swale and ridge topography, the low swale was likely artificially built up providing a higher surface upon which Rattlesnake Mound was constructed (see Figure 2.5). The same is likely similar for Mound 72, also located in a low, wet area; visible on LiDAR imaging, the land immediately surrounding Mound 72 appears higher than the associated wetland suggesting that the earth underneath was artificially elevated to provide a stable surface for construction (see Figure 2.5).

Specifically, during the University of Wisconsin, Milwaukee's excavations of Mound 72 directed by Fowler (1999: 17) between 1967-1971, excavations encountered evidence for a layer of "blue/black tacky clay…greatly disturbed or removed in the construction of the overlaying mound." In addition to the removal of soils and preparation of the ground surface the area underneath Mound 72 had little evidence for prior habitation or residential features (see Fowler et al. 1999). Watson (2005) and Fowler (1999) hypothesize that the Mound 72 area was home to a large Woodhenge used to mark the summer and winter solstices. This hypothesis, however, is based on the identification of three *possible* post pits Watson and Fowler argue contained large upright posts emplaced prior to the construction of Mound 72 and Mound 96, a small, low platform mound located southeast of the Mound 72 area. The profiles of these pit features do not support the aforementioned conclusion and more likely identify domestic pit features. As part of the University of Wisconsin excavations Watson's (2005) work at Mound 96 did reveal the presence of at least one rectangular single-set post building and one associated pit feature built prior to the construction of the mound. The identification of these pre-mound features further corroborate a pattern of land use where Cahokians intentionally modified the natural landscape prior to the construction of mounds, a practice replicated throughout the Cahokia, St. Louis, and East St. Louis precincts.

Kunnemann Mound (excavated by Preston Holder in 1955) was also situated on top of a modified landform; more specifically a midden deposit "approximately 13-30 cm in thickness with an undulating bottom" followed by a sandy fill (47 cm thick) representing the beginnings of mound construction (Pauketat 1993: 26-27). The Kunnemann Mound group bordered a marshland, and was constructed on top of a ridge elevating the mound above the surrounding lowlands (see Dalan et al. 2003: Figure 17). Additional evidence for landscape modification is present at Cahokia's Dunham Tract and Tract 15A (west of Monks Mound and the Grand Plaza); excavations indicate the construction of a 75 m long, shallow, meandering drainage ditch built in a low-lying area (during the early Lohmann phase) that, due to its lack of post-molds and shallow depth, was likely constructed to carry rain waters away from this early Cahokian neighborhood (Pauketat 1998).

Two mounds in the East St. Louis precincts (E-11 and E-6) were both constructed over slight natural swales. Pauketat (2005: 134) argues, "The mound [E-6], in fact, was part of an infilling of a low-lying swale, not all of which seems to have been part of an actual raised platform." Pauketat (2005: 134, emphasis original) goes on to argue that the previously identified 'natural' fills "are probably *not*" natural and instead fill was deposited to "ostensibly elevate and level the former swale." This swale, like the filled-in borrow pits discussed above contained the remains from a midden pit, and "later swale fills interbedded with obvious mantles and construction fills of Mound E-6" (Pauketat 2005: 135) (see also Kohl and Fortier 2007). This evidence indicates that the land immediately underneath Mound E-6 was necessarily anthropogenically modified creating a slightly higher and more stable surface for the construction of the E-6 mound (Pauketat 2005: 135).

Evidence for mitigating the natural landscape in such a way is further supported by the "expansion of a tongue of land under a small promontory mound in the West Borrow Pit mound group [and] evidence of ground leveling before construction began on the Powell Mound" (Dalan et al. 2003: 164). It is no secret that Cahokians were master earth movers with specific understandings of how and when to use particular soils and materials to transform the natural and man-made landscape (see Bareis 1975; Dalan et al. 2003; Pauketat 2002; Reed 1969; Sherwood and Kidder 2011; Smith 1969). Such unique compositions as 'buckshot' fills, viscous gumbo clays, intentional layers of black and yellow (or lighter colored) sediments, basket loads, sod blocks, and mantles of fills characterize some of the dirt selected for and used in monument construction and changes to the landscape (fill types described in Chapter 4).

In addition to filling in low lying areas and setting up drainage for standing water, one of the most labor-intensive projects of Cahokia's emergence was the construction of Monks Mound and the associated Grand Plaza (Dalan et al. 2003; see also Alt et al. 2010; Fowler 1997; Pauketat 2013b). Dalan (1997) argues that the builders of Cahokia "graded down the naturally undulating topography of this area, truncating ridge-tops and filling in the intervening low swales" (see also Alt et al. 2010; Pauketat 2004: 76). Excavations targeting construction of the 19-24 ha plaza "verified that most if not all of it was built in one massive labor project, marking the end of the Terminal Late Woodland period and the beginning of the Mississippian Lohmann phase" (Pauketat 2004: 77; see also Alt et al. 2010; Holley et al. 1993). In a recent article Alt et al. (2010: 144) argue that the construction of the Grand Plaza was integral to the Lohmann phase redesign of Cahokia and that at least "10,000 person days were involved in digging and moving earth for about one quarter to one third of the lower plaza fill." What makes this estimate so impressive is that this construction occurred "in one massive fill unit" marking Cahokia's emergence coordinated with the removal of the Terminal Late Woodland neighborhoods that previously occupied the area (Alt et al. 2010: 142, 144).

Plaza construction probably occurred at the same time as the initial building stages of Monks Mound (6.5 m high single massive construction) as well as the construction of Mound 49, a small ridge-top located in the northwestern portion of the plaza (Alt et al. 2010; Pauketat et al. 2002). We know this from excavations conducted into the Grand Plaza, Mound 49, and Monks

Mound that identify the sequential stratigraphic relationship among these earth works (see Alt et al. 2010; Pauketat et al. 2002; Dalan et al. 2003). The Grand Plaza is superseded by the construction of the base of Mounds 49 and Monks Mound.

In specific regards to Monks Mound, Schilling (2012, 2013) recently postulates that the Monks Mound labor project did not begin until AD 1100 seemingly discounting contextual archaeological data (see Dalan et al. 2003 for example) that would instead suggest the construction of Monks Mound corresponds to the early date of AD 1050 (see above discussion). Further, Schilling's assumption is based on a modal date of AD 1100 gathered from a temporal model of a series of C^{14} dates collected from multiple excavations/cores into Monks Mound from 1968-2010. When looking at Schilling's reported dates, he also records a mean date of AD 1095, and a range of dates from AD 1052-1136. When considering these dates in conjunction with other known construction sequences (like those discussed above) that began in the early Lohmann phase, it is more likely that the basal mound portion of Monks Mound was constructed in conjunction with these other massive labor projects (like the causeway and the Grand Plaza); if Cahokians had a plan for their city, why would they wait 50-100 years *after* the construction of other major components of the Cahokian landscape to build the largest mound at the site? Monks Mound is too large, central and tied in with Cahokia's city plan and organizational grid to be an 'afterthought'- one constructed after people began rearranging their lives, households and beliefs to a new Cahokian way of being (see also Pauketat 2013a).

Importantly, the construction of Monks Mound (total fill volume of 730,000-740,000 cu m^3 [Schilling 2010]) and the Grand Plaza (total fill volume of 13,200 cu m for an estimated one fourth of the plaza [Alt et al. 2010]) were still a small part of a larger labor project that is now known to include the construction of the Rattlesnake Causeway (with an estimated fill volume of 11,896 cu m [estimate my own, explored in detail in Chapter 5]), the initial stages of Mound

72, Wilson Mound, and likely Rattlesnake Mound along with additional neighborhoods, mounds, and plazas (see Chapters 4, 5; Alt et al. 2010; Baires 2014; Dalan et al. 2003; Fowler 1997; Reed et al. 1968; Pauketat 2013b; Schilling 2013).

Additionally important when thinking about the emergence of Cahokia, landscape modification, and construction projects is looking to the residential areas for a broader understanding of the influence Cahokia had on the surrounding populations. It is estimated that at Cahokia's peak (Stirling phase AD 1100-1200) this precinct was home to approximately 16,000 people living in a combined area of 3 ha (Pauketat and Lopinot 1997; Pauketat 2004: 78). Tracts 15A and 15B (both located west of Monks Mound) revealed two areas of pre-Mississippian residential features replaced, seemingly all at once, by Lohmann phase Cahokian religious and monumental pole and thatch buildings (Tract 15B), and residential neighborhoods (Tract 15A) (Pauketat 2004; 2013b). The soils needed to construct the earthen monuments of Cahokia were sometimes borrowed from the areas where Terminal Late Woodland communities resided, essentially uprooting small villages and repurposing lands for the construction of Cahokia's central precinct (Dalan et al. 2003: 71).

Importantly, one of the biggest changes to domestic life was the introduction of the wall-trench house; Alt and Pauketat (2011:108) argue that this type of construction evidences a "fairly rapid, widespread alteration in architectural conventions in the late-eleventh- and early-twelfth-century Midwest and Southeast." Further, this style of household architecture suggests a standardized building practice "permitting rapid construction" of houses and neighborhoods implementing new ways of organizing community space almost immediately alongside mound and plaza construction projects (Alt and Pauketat 2011: 109; see also Pauketat and Alt 2005).

Furthermore, neighborhoods (not to mention the mounds and plazas) were organized to what has come to be known as the Cahokia grid (Collins 1997; Mehrer and Collins 1995). This grid was first recognized by Brackenridge (1814), W.K. Moorehead (1929) and later documented by Harriet Smith (1969) during her excavations into Murdock Mound (No. 55)-a small platform mound located southeast of Monks Mound. Smith (1969) concluded that the orientation of Murdock Mound's base was positioned 5^{o} east of north and aligned with Monks Mound. Although, she initially attributed this to a mistake on the part of the mound builders attempt to align the two monuments

> *optically*…sighting past the pole at the NW corner until this line of sight seemed parallel…with the alignment of the east face of the big [Monks] mound…this spot was actually 5 feet too far to the west, thus giving the Platform a west baseline of 5^{o} further east of north rather than the standard orientation…this human error testifies to the presence of Monks Mound as the focal point of the Cahokia complex (Smith 1969: 70, emphasis original).

Nelson Reed (1969; PC 2012), on the heels of Harriet Smith, also identified this central grid system recognizing the 5^{o} offset axis as it was marked by the orientation of Monks Mound and what he thought at the time was a long, raised, straight ridge emanating from Rattlesnake Mound through the center of Cahokia's central precinct. Reed states (1969: 33), "Monks Mound has an axis running five degrees to the east of north, an orientation repeated in a number of surrounding mounds, houses, and the eastern stockade." Reed (1969: 35) continues to argue that the mounds of Cahokia were arranged around a plaza "which dictates that mounds will be at right angles to one another or in alignment with each other…thus the east-west and five degrees to the east of north arrangement at Cahokia appears to be the product of Cahokia Creek and chance, not astronomy". Reed's assumption that the orientation was a product of chance, however, has since been re-evaluated; this orientation, more recently, has been identified as intentional and marking other cosmological alignments that include references to a lunar standstill occurring every 18.6 years (Pauketat 2013a; Romain *in press*).

Melvin Fowler (1974) identified a different set of alignments and argued that the grid was part of Cahokia's original city plan, oriented to the cardinal directions (as opposed to the five degree offset) and tied to distinct ridge-top 'marker mounds', marker posts, Woodhenge circles, and solstitial alignments (Fowler 1996; Kelly 1996; see also Collins 1997; Rolingson 1996). Fowler argued that Monks Mound was at the center of such an alignment with the four plazas (North, South, West, and East) marking the cardinal directions (see also Kelly 1996: Figure 8.2). More specifically, Fowler's cardinal alignment connects Rattlesnake Mound on the south with Mound 72, Mound 49, ending within the Kunnemann Mound group to the north along a hypothetical 2.82-kilometer long north/south line. This line connects the western edges of Monks Mound (at an upright wooden post emplaced on the First Terrace), the center of Rattlesnake Mound, and Mound 49 with the southeastern corner of Mound 72 and a large upright marker post Fowler believed to be part of a Woodhenge circle constructed prior to the building of Mound 72 (Fowler 1997). Dalan et al. (2003: 156) argue, and I would agree, that Fowler's assumptions of orientation are problematic because "the size and chronology of the Monks Mound posts [on the completed First Terrace]…appear much later in time" than the Mound 72 posts supposedly marking this north-south alignment. Additionally, the Mound 72 upright posts and Woodhenge circle were never corroborated during excavation. Fowler identified two upright marker posts with certainty and extrapolated the possible location of the others.

More recently, this direct cardinal alignment proposed by Fowler has been challenged again, brought back to Smith's original assumption, and consistently argued that Cahokia's grid system is not cardinal, but rather 5^{o} off of cardinal north; this orientation is further supported by the slightly off-angled positioning of Fowler's so-called marker mounds (in particular Rattlesnake Mound) and the orientation of the recently corroborated Rattlesnake Causeway (Chapters 4 and 5) (see Baires 2014*;* Pauketat 2013a; Romain *in press*).

For the purposes of this dissertation I adhere to Smith's original discovery that Cahokia's orientation is in fact not cardinal but intentionally constructed 5^{o} to the east of cardinal north. I base this argument specifically on the orientation of the Rattlesnake Causeway (see Chapter 5), its connection to Mound 72, Rattlesnake Mound, and the Grand Plaza and to the southeastern corner of Monks Mound (see also Romain *in press*; Pauketat et al. *in press;* Pauektat 2013a).

The resultant mounds, plazas, neighborhoods and causeway were intentionally planned and oriented constructions, which not only oriented the physical space of Cahokia but also the events, people, and experiences (public or individual) that took place there. Walking through such a city as Cahokia likely presented a multitude of smells, sounds, events, and happenings that afforded certain feelings and sensations tied to particular practices and even memories (see Alcock and van Dyke 2003; Mills and Walker 2008). Such experiences were intertwined with the physicality of the place, linking place with belief and practice. Contrary to some interpretations that focus on the delineation of elite and commoner spaces (see Brown 1971, 2003; Byers 2006; Milner 1998; Peregrine 1992) as paramount to the construction of Cahokia, I would argue that the organization of this precinct was to make accessible the spaces of everyday life. Places, whether restricted to certain persons or activities, were still experienced by the people walking by them, listening to the events taking place, or directly participating; these knowledges were bundled together with the materiality of Cahokia and translated into the everyday practices of people (see Pauketat 2013a; see also de Certeau 1984).

What I mean, more simply, is that Cahokia was not a segregated community with elites here and commoners there, but rather that this space was more of a convergence of people, places, and things that moved amongst and between archaeologically perceived boundaries in ways not adequately described by our 'western' perspectives. I base this hypothesis in theories of relationality and draw particularly from an Ingoldian (2008: 2) perspective that engages with processes, things, and their interrelatedness:

> …Gilles Deleuze and Feliz Guattari argue that the essential relation, in a world of life, is not between matter and form, or between substance and attributes, but between *materials* and *forces* (Deleuze and Guattari 2004: 377). It is about the way in which materials of all sorts, with various and variable properties, and enlivened by the forces of the Cosmos, mix, and meld with one another in the generation of things (emphasis original).

But, we are not done looking at the composition of Cahokia's landscape; and in a dissertation concerned with relationships the contemporaneous and nearby precincts of East St. Louis and St. Louis, not to mention the rural and outpost communities of the nearby Illinois Uplands, must also be discussed.

East St. Louis, St. Louis and the Illinois Uplands

The sites of East St. Louis (to the southwest of Cahokia) and St. Louis (across the Mississippi River from East St. Louis) comprise a central complex of Cahokian communities that co-existed and were part of what has been previously dubbed the "central administrative complex" (Pauketat 2004: 71; see also Pauketat et al. 2013) (see Figure 2.1). It is estimated that the East St. Louis site had approximately 45 mounds (organized in a semi-circular fashion) with associated temple buildings, storage huts, and walled compounds the extent of which are only recently being revealed (Kelly 1997; Fortier ed. 2007; Pauketat 2004, 2005; Pauketat et al. 2013; see also Kruchten et al. 2009). By the time J.R. Patrick (50 years after their discovery by Brackenridge) mapped the site the number of mounds had been reduced to two-thirds. Perhaps the most well known mound to be destroyed (in 1870) from this group is the Cemetery Mound: a long ridge-top shaped monument similar in size to Powell and Rattlesnake Mounds at Cahokia. Cemetery Mound covered two large mortuary pits and several large cedar posts, and was constructed on top of a series of architectural features (Kelly 1997: 149-150). Not much else is know of this monument (besides it's height at 12.2 m), but it can be assumed that like its shape, it also shared characteristics with the other known ridge-tops at Cahokia and the Big Mound at St. Louis (Kelly 1994: 20).

In light of recent excavations (Mississippi River Bridge Project [MRB]) conducted by the Illinois State Archaeological Survey, a "walled-in ritual-residential zone or elite compound" of the East St. Louis site (occupied from AD 1150-1200) was built and extensively burned in a single episode likely contributing to the beginning of Cahokia's collapse (Pauketat et al. 2013: 208). Early excavations (conducted by ISAS between 1991-1992) support the conclusion that East St. Louis was a large, organized precinct on par in scale and contemporaneous (AD 1100-1200) with its neighbor to the west, Cahokia (Fortier ed. 2007; Pauketat 2005). Similar to Cahokia, East St. Louis consists of a site layout that includes platform and ridge-top mounds and public spaces with large upright posts. These posts and their associated pits were massive, reaching depths of 2 m, with the posts themselves measuring up to 1 m in diameter (Pauketat 2005: 312). Evidence from the most recent excavations (conducted by ISAS) indicates "the East St. Louis precinct was founded as a public ceremonial complex at the beginning of the Lohmann phase, virtually concurrent with the dramatic redesign of Cahokia" (Pauketat et al. 2013: 211).

Recent excavations have revealed "nearly 1,300 structures, 70 plus monumental post features, nearly 3,000 pits, and several burial areas, as well as the base of a heretofore unknown rectangular mound" all dating between AD 900-1200 (Pauketat et al. 2013: 211; see also Brennan-Christiansen P.C. 2013; Fortier ed. 2007; Kruchten et al.2009; Pauketat 2005). Interestingly, the structures that make up this complex (including those revealed during the North and Southside excavations) were not typical domestic buildings; they were large rectangular and circular structures repeatedly rebuilt through the Stirling phase and "often in the same location" near Mounds E-1, E-6, and E-11 (Pauketat et al. 2013: 212; see also Fortier ed. 2007; Kelly 1997; Pauketat 2005). Pauketat et al. (2013: 212) hypothesize that "[g]iven their size, rigid orientations, and lack of domestic debris, these buildings might have been meeting halls, elite housing, and special religious, administrative, or storage facilities."

Identified in the earlier 1991-1992 excavations (North and Southside projects) and the most recent MRB project, are "lengthy wall segments that are best interpreted as parts of enclosures" surrounding 25 excavated 'huts' constructed alongside the outer wall segments (postdating the previously constructed inner walls) and associated Cemetery Mound (Pauketat 2005: 312; Pauketat et al. 2013). These huts are square in plan and very small when compared to the surrounding rectangular and circular buildings. Kelly (1997) identified the buildings from the Southside excavations as 'storage sheds'; these contemporaneous structures burned around the same time. Similar structures on the Northside were also identified as storage buildings, but were slightly larger in size with a few (8) being destroyed by fire. In total Pauketat et al. (2013) identify 22 of the 25 storage huts as burned by fire; their contents contained typical unused domestic items that included pottery, foodstuffs, and tools. What makes this assemblage interesting is that these buildings were not associated with any particular domestic or neighborhood space and instead were surrounded by walls. Pauketat compares these compound walls to similar constructions identified at Cahokia's Tract 15B; both sets of walls likely enclosed special compounds or buildings providing "protection from intruders…as indicated by the bastions placed along its walls" (2005: 312). The walls at East St. Louis were rebuilt at least once, and possibly enclosed "functionally distinct groups of buildings or individual high-status areas" (Pauketat 2005: 313). Due to the lack of domestic households, and the enclosure of this area by walls, East St. Louis is described by Pauketat et al. (2013: 221) as, "it was overbuilt and underused, possibly for and by prominent religious or administrative families."

Additionally, the mounds at St. Louis (or "Mound City") comprise the third part of this administrative complex and consisted of at least 26 mounds and a 2 ha central plaza (Byers 2006). Mound City, unfortunately, has long since been destroyed for the construction of downtown St. Louis, MO (Byers 2006; Pauketat 2004). One of the largest mounds in the group, Big Mound, was another ridge-top tumulus and the last to be destroyed in 1869 (Pauketat 2004). Not much is known about the St. Louis site limiting our ability to fully comprehend the vast expanse, planning, and power needed to construct such a large administrative complex. Henry Brackenridge, in 1811 (1814: 187-188), did document and describe the mounds at East St. Louis as he left Mound City:

> I crossed the Mississippi at St. Louis, and after passing through the wood which borders the river, about half a mile in width, entered an extensive open plain…I found myself in the midst of a group of mounds, mostly of a circular shape, and at a distance, resembling enormous haystacks scattered through a meadow. One of the largest…was about two hundred paces in circumference at the bottom, the form nearly square…the top was level…Around me I counted forty-five mounds.

Importantly, Brackenridge's description highlights the unique similarities shared amongst these three sites, focusing on the organization of mounds and plazas and the integration of neighborhoods within the city of Cahokia. In addition to Brackenridge's account, Conant (1879: 28) references the mounds of St. Louis noting that all but a small few were destroyed, but does cite other accounts of the mounds noting their orientation in a "parallelogram" and describes the Big Mound "with a broad stage on the river side; it is thirty feet in height, and one hundred and fifty in length; the top is a mere ridge of five or six feet wide."

Brackenridge goes on to discuss the connections among the three precincts noting that a series of mounds and small neighborhoods connected St. Louis and East St. Louis with Cahokia (see also Pauketat 2004; Pool 1989). Interestingly, at least two of the mounds connecting these precincts were ridge-top burial monuments marking the landscape with their peaked tops and large rectangular bases (Pauketat 1994, 2013a). Powell Mound (and its associated smaller mounds and neighborhood), the largest of these and now since destroyed, marked the northwestern corner of the Cahokia precinct and was somewhat isolated from the central area of the city. Wilson Mound, or Junkyard Mound, a smaller ridge-top, was located between Cahokia and East St. Louis along "Indian Lake" southwest of Powell Mound (see Pauketat 2004, 2013a). Additionally, Cemetery Mound (in the center of East St. Louis) and Big Mound (on the northern end of the St. Louis site) were ridge-top monuments (now since destroyed) marking important points on the landscape of their respective precincts (Pauketat 2004). Ten kilometers northwest of Cahokia lay the Mitchell Site, consisting of an estimated ten mounds including a large ridge-top monument (Great Mound) (Porter 1969). Additional mound centers connected to the city of Cahokia are located in the uplands southeast of the Cahokia precinct and include (for example) the Pfeffer site, Emerald Mound, and the Copper site (Baltus 2010; Otten et al. 2007; Pauketat 2013a). To fully understand the expansive network of Cahokia, I turn briefly to a discussion of sites in the nearby Illinois uplands.

The Illinois uplands, like its bottomland counterpart, is a rich environment with streams, creeks, fertile farmland (still extensively farmed today), fish, mammals, and prairies. It is no surprise that this area became home to Cahokian outposts, farmsteads, unique lunar shrines, and intermittently occupied mound sites (Pauketat 1994; 2003; 2013a; see also Alt 2001, 2002, 2006; Emerson 1992; 1997, 2002; Emerson and Hargrave 2000). Emerson (1997; see also 1992) has suggested that such rural communities are broken up into three types: nodal households, civic nodes, and ceremonial nodes. Nodal households would represent a single family, possibly a farmer; civic nodes "reflect the specialized material expression of community or centralized political or social power"; ceremonial nodes would be sites involved in ritual and mortuary activities (Emerson 1997: 174-175).

Although these categories, I would argue, are not mutually exclusive they do present a useful way of thinking through the types of communities present in the 'rural' countryside of Cahokia. One does encounter small farmsteads seemingly isolated from a larger community, whole mound centers, Cahokian outposts, and even immigrant communities attempting to adopt Cahokian life ways (see Alt 2002, 2006; Emerson 1991, 1997; Pauketat 1998, 2003, 2013a). With evidence from the Pfeffer, Grossmann, and Halliday sites, three communities with relatively unique settlement patterns, I discuss the relationships between the Cahokia precinct and the uplands. A common conclusion drawn about sites located in this area is that they served as a "bread basket for Cahokia populated by resettled locals and immigrants in the prairie-edge uplands east of Cahokia" (Pauketat 2013a: 133; see also Alt 2001, 2002; Pauketat 2003). The following site descriptions will by no means be exhaustive, but rather should provide a concise view into the expansive network of Cahokia and its related communities. I begin with Grossmann, as it most closely resembles Cahokia itself and provides a direct link between the uplands and the American Bottom.

The site of Grossmann (a late Lohmann to late Stirling phase occupation), originally excavated by the Illinois State Archaeological Survey in 1999 and as part of the University of Illinois Richland Archaeological Project in 2001-2002, is located 15 km southeast of Cahokia and exhibits characteristics seen at Cahokia itself, which include Cahokian orientations (cardinal alignments and the five-degree offset), large rectangular wall trench public buildings, large circular council houses, a unique mortuary charnel house, and special T-shaped buildings (Alt 2006; see also Pauketat 2013a, Baires 2012 report on file ISAS). Alt (2006) cites these very Cahokian buildings to argue that this community was in fact a Cahokian outpost linking the communities of the uplands with the Cahokia precinct. Importantly, Alt draws connections among the ceremonial nodal sites recognized by Emerson (1997) to discuss the influences

Cahokia had over populations in the surrounding area. She notes that the site of Grossmann was complex, contributing to a unique network of relationships that actively (re)created important Cahokian practices like the intentional orientation of space, the bundling of bodies for burial, and the caching of important objects (Alt 2006).

Additionally, Alt (2006) ties Grossmann and it's influence to sites like Halliday; a small immigrant community located 16 km east of Cahokia. Excavations of Halliday were completed by the Early Cahokia Project (see Alt 2001 and 2002; Pauketat 1996, 1998; Hargrave and Hedman 2001). Halliday dates from the early Lohmann phase through the early Stirling phase, overlapping with nearby Grossmann. Halliday occupants lived in the classic Terminal Late Woodland style, with single post houses arranged around a central courtyard. Alt suggests that the people living at Halliday were of non-local origins being actively incorporated in the Cahokian ideological system (2006: 79-80). This argument is supported by a range of artifacts that include things common to Cahokian assemblages (Mill Creek chert hoe flakes, Burlington chert flakes), however, these tools were intensely reused and not present in high percentage, which Alt (2006: 80) argues might have been due to Halliday inhabitants' restricted access to raw materials. Further, pottery identified at the site encompassed a wide range of varieties including "non-local types such as Varney-like pottery, as well as some Yankeetown, northern bluff tradition, and French Fork Incised" (Alt 2006: 80). Drawing on the orientation of households, the introduction and control of typical Cahokian materials, and the presence of non-local pottery wares, it is likely that Halliday was a community of immigrants in the process of becoming Cahokian (see also Alt 2001, 2002; Pauketat 2000).

Additionally, the site of Pfeffer (a Lohmann to Stirling occupation) was a small mound complex situated in the uplands 22 km east of Cahokia. Pfeffer was excavated as part of the University of Illinois Richland Archaeological Project (2000), a University of Illinois field school

(2007), and expanded by ISAS excavations in 2007 and 2008. Pfeffer is a unique mound complex with rectangular buildings rigidly oriented either to the common Cahokian solstitial and cardinal orientations, or to two distinct angles oriented to movements of the moon (Pauketat 2013a: 134). The site of Pfeffer contains at least one large platform mound with a series of nearby possible conical mounds (now since destroyed for the town of Lebanon) setting up a linear arrangement of the site. In addition, oddly constructed and used rectangular buildings were present alongside T and circular shaped buildings traditionally seen at Cahokia. What makes this site so unique, though, are the building floors and pit bottoms constructed with alternating colored linings, the specially in-filled and decommissioned house basins, and the aboriginal re-excavations into these same features (Pauketat 2013a; see also Otten et al. 2007). Pauketat (2013a: 172) argues, "these deposits consisted of the ashes of happenings possibly connected with ceremonies timed to a lunar cycle." There is no doubt Pfeffer is a unique community of possible immigrants and Cahokian's residing intermittently together in the Uplands to monitor and mark the movement of the moon. But, what does this have to do with Cahokia? I would argue, following Pauketat (2013a), that the community of Pfeffer was another iteration of Cahokian ways of being, enmeshed in transforming the natural landscape to monitor the cosmos and to inscribe important happenings into the land (see also Otten et al. 2007).

CONCLUSIONS

When considering the impact the Cahokia precinct had on the surrounding landscape of the American Bottom in southwestern Illinois one must look to the broader regional context. Cahokia's importance and influence becomes more pronounced when considering the expansive relationships that connected contemporaneous precincts like East St. Louis and St. Louis to Cahokia, not to mention the smaller nodal sites located in the Uplands. Where others have pointed to economics, politics, and environmental change as causal to Cahokia's emergence (see

Cobb 2003 for a review), I point to a religious revival that was literally built into the land, and experienced (and recoverable archaeologically) on both the macro and micro scales (see also Emerson et al. 2008; Pauketat 2013a). The modification of the Cahokian landscape, the introduction of distinctive new ways of living, and the presence of thousands of people moving into the area all point to a common motivating factor for the creation of this medieval city: a religion based in the movement of the earth, the monitoring of the cosmos, and the burial of the dead.

In this chapter, I discussed the natural and built environments of Cahokia addressing multiple examples of landscape modification, presenting an argument that the construction of Cahokia not only required a willing community of laborers but that these individuals likely shared a vision for their new city. This vision encompassed new lifeways that included the introduction of unique pottery styles, methods for home construction, and intensive agriculture. This vision also included the need to drastically re-shape the natural landscape carving out level plazas, earthen causeways, and ridge-top mounds during Cahokia's early 50 years. Importantly, such modifications were not isolated to just one of the Cahokia precincts, but shared across all three and even brought into the uplands creating new communities of immigrants, Cahokian outposts and religious sites contemporaneous with Cahokia's emergence. The roles of ridge-top mounds, mortuary practices, and the Rattlesnake Causeway were central and formative to this vision. These mounds were inherent to Cahokia's design, built along key points of the landscape and connected to one another by unique alignments and the central causeway. Ridge-top mounds, as a network of religious belief and practice were additionally connected to each other, to other monumental constructions, and to the inhabitants of Cahokia via practice and events. They were not isolated monuments but entangled with the re-invention of Native American pre-Columbian lifeways ca. AD 1050.

By focusing on the aboriginal modification of the American Bottom landscape in this chapter I chose to emphasize the labor needed to build this city and the likely intent behind these construction projects. In particular, I emphasized the vastness of the city of Cahokia highlighting the similarities in site orientation and mound construction techniques among Cahokia, East St. Louis, and the St. Louis precincts. All three precincts consisted of mound and plaza complexes, with earthen mounds in platform, conical, and ridge-top shapes aligned to the five-degree offset, and other celestial alignments (e.g. cardinal alignments). Additionally, the sites in the uplands (which include additional mound complexes likely the recently re-excavated Emerald Mound complex) further expanded Cahokia's vision, likely converting communities of immigrants to new lifeways being practiced in the floodplain (see Pauketat 2013a). Understanding these relationships are important when thinking through the broader implications and impacts of the city of Cahokia which, importantly foregrounds a central narrative of religious belief and practice moving beyond economic, political, and emerging complexity models. Revisiting the quote by Vine Deloria Jr. (2003) in Chapter 1, "The places where revelations were experienced were remembered and set aside as locations where, through rituals and ceremonials, the people could once again communicate with the spirits" emphasizes the importance of the land in founding and memorializing practice and belief.

At the beginning of Chapter 1 I said I 'will focus on mortuary practices (and associated beliefs and landscape modification) as *generative of cultural change* (*sensu* Pauketat 2010)' where the planning, building, and use of ridge-top mortuary mounds were essential to constructing a new religion and thus a new Cahokian society. This may at first seem like a circular argument, but I would argue it is not; rather I espouse that ridge-tops and everything tied with them were the physical manifestation and practice of a new religion. They are the archaeologically recoverable part of the story whereby we can attempt to trace the trajectory of

Cahokian religious phenomenon looking to the burial of the dead and the manipulation of the landscape to embody the cosmos.

FIGURES

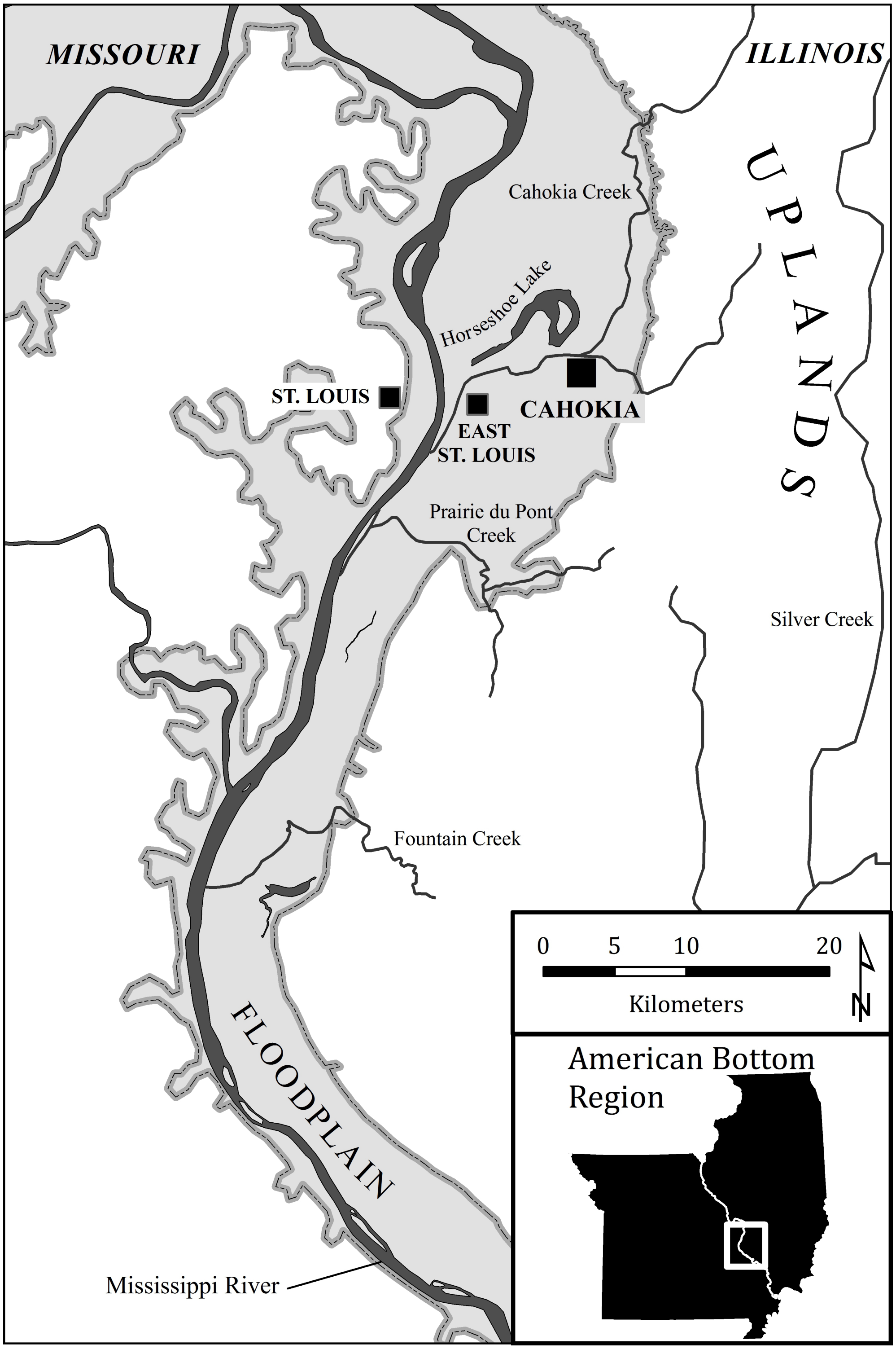


Figure 2.1 American Bottom Region showing the location of Cahokia, East St. Louis, and St. Louis precincts

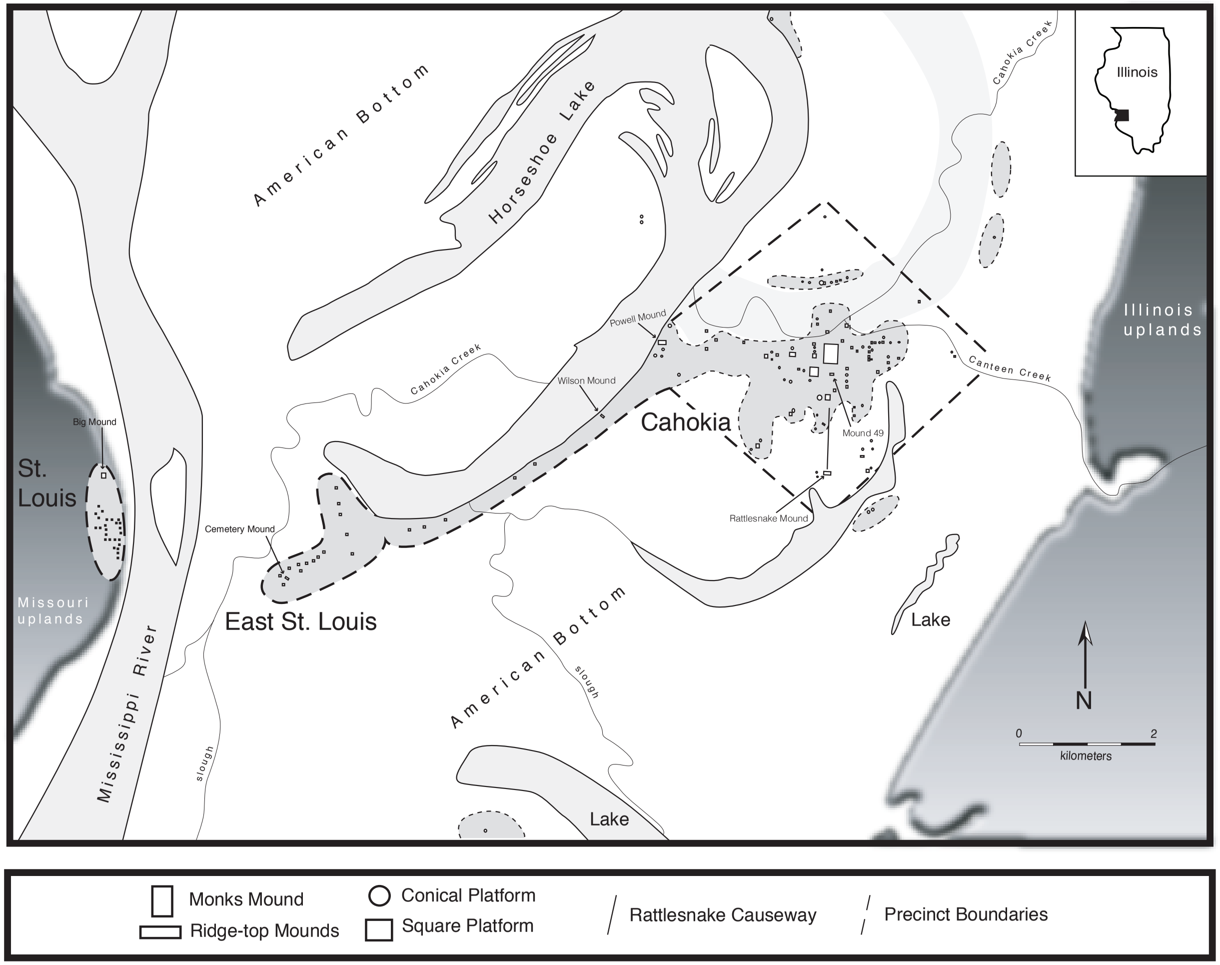
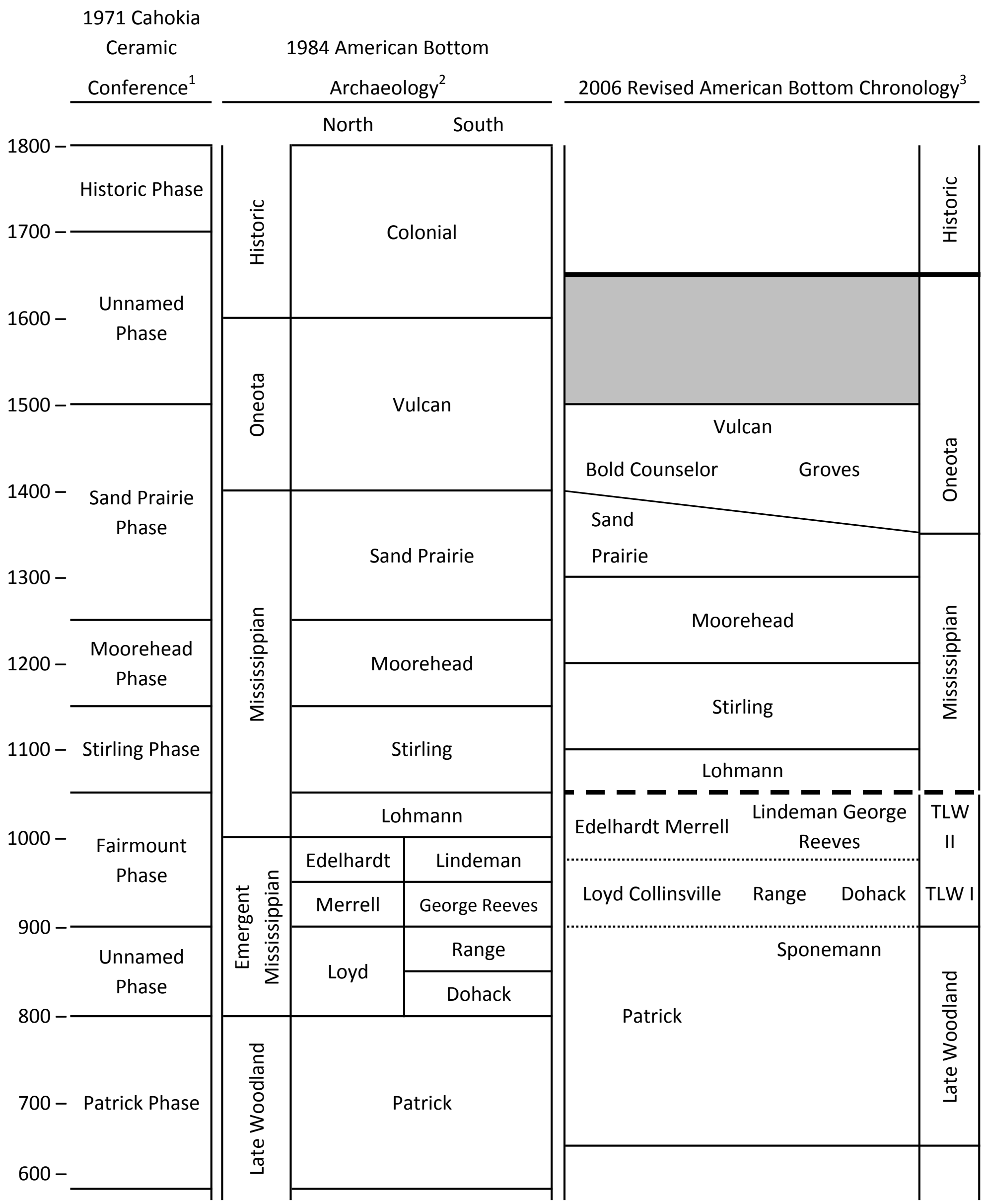


Figure 2.2 Cahokia, East St. Louis and St. Louis Precincts showing location of Ridge-top Mounds and Rattlesnake Causeway (map adapted with permission T.R. Pauketat)



1 Adapted from Fowler and Hall 1975 Figure 1; Cahokia data only

2 Adapted from Bareis and Porter 1984 Figure 3; Cahokia data and FAI-270 data used

3 Adapted from Fortier, Emerson, and McElrath 2006 Figure 3; Cahokia data, FAI-270 data, and subsequent research used

Figure 2.3 Chronology Charts for Cahokia and American Bottom Region (after Betzenhauser 2011)

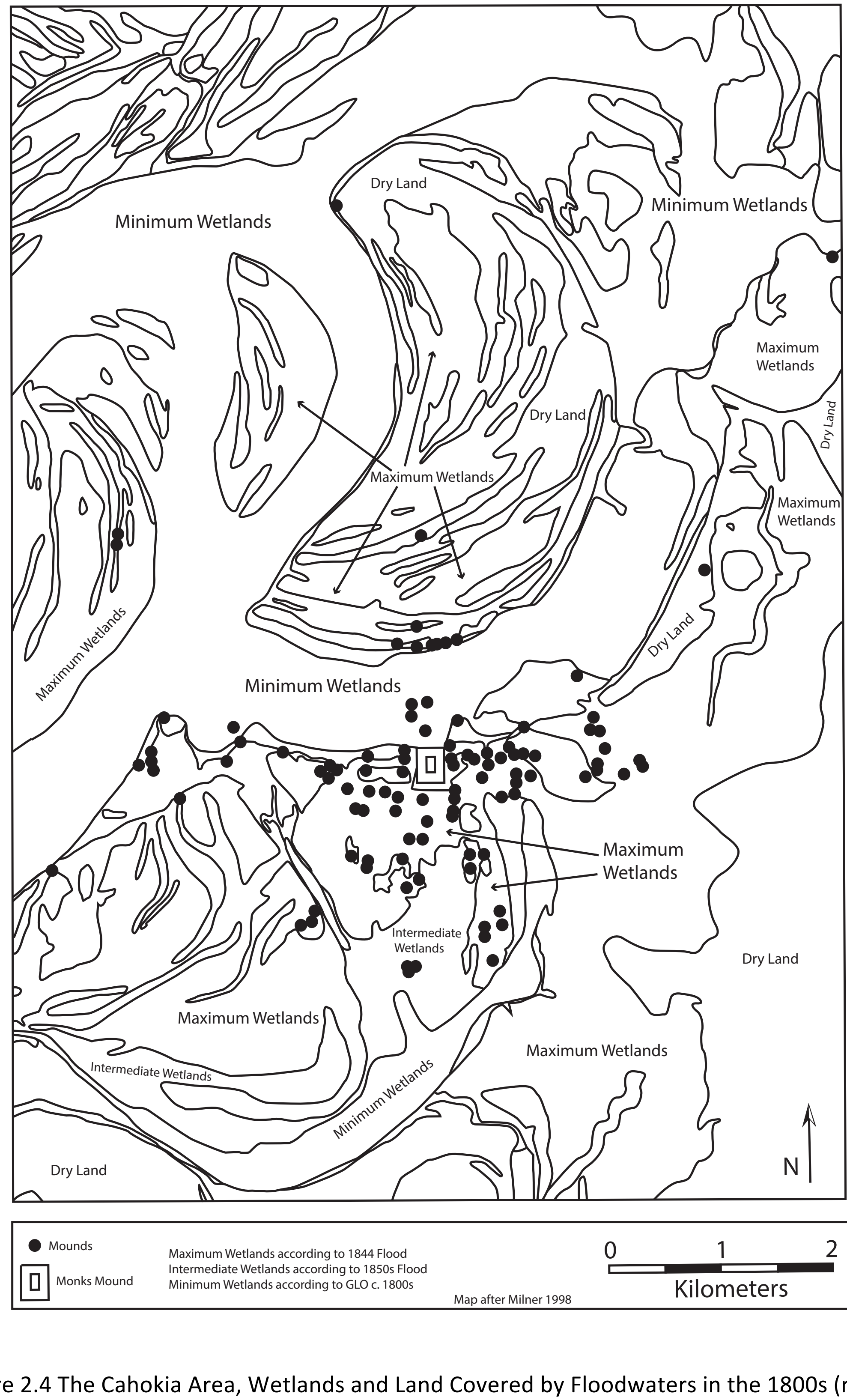


Figure 2.4 The Cahokia Area, Wetlands and Land Covered by Floodwaters in the 1800s (re-drawn from Milner 1998)

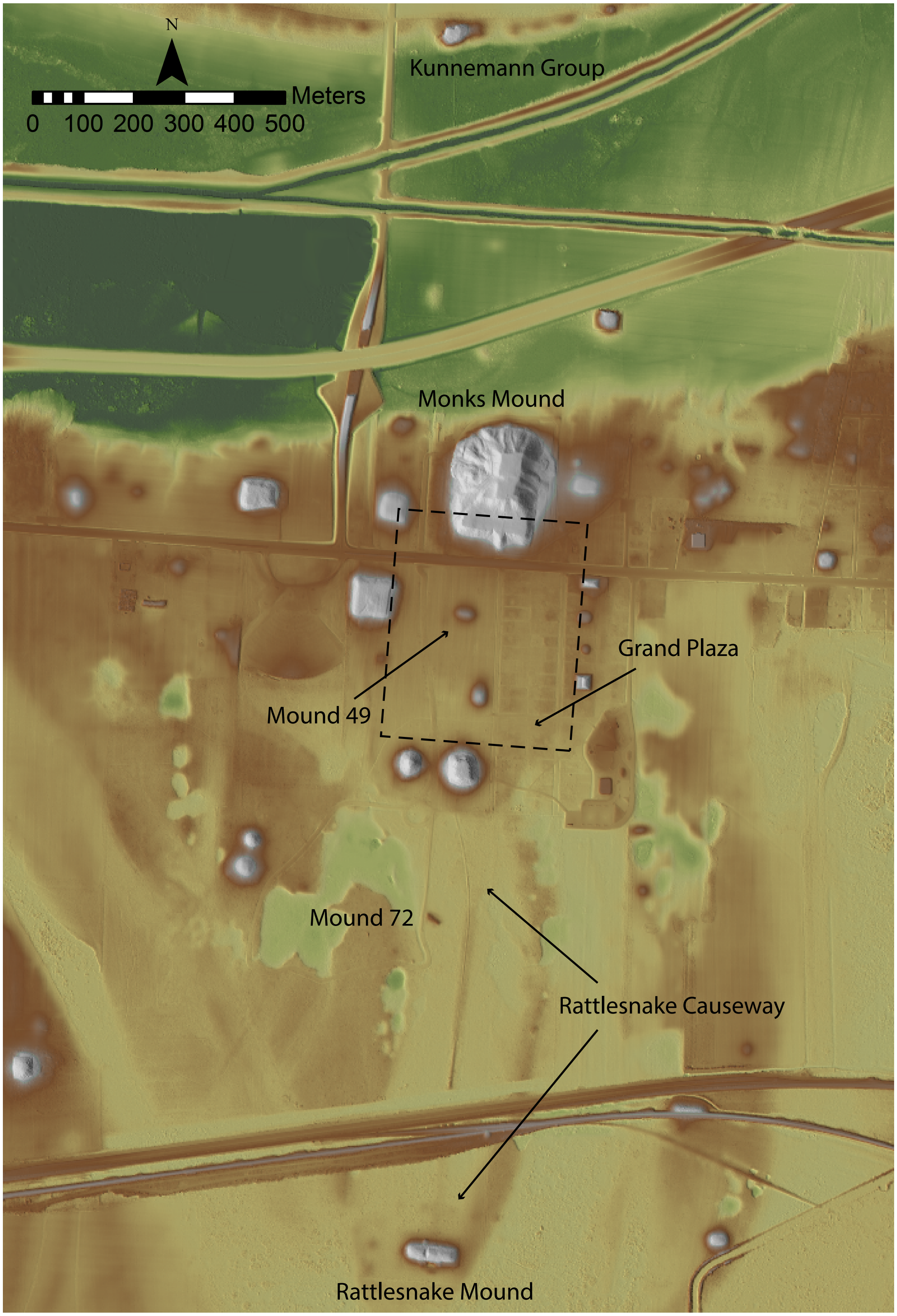


Figure 2.5 Cahokia Precinct depicting Rattlesnake Mound, Rattlesnake Causeway, Grand Plaza and Monks Mound (original LiDAR image courtesy ISAS)

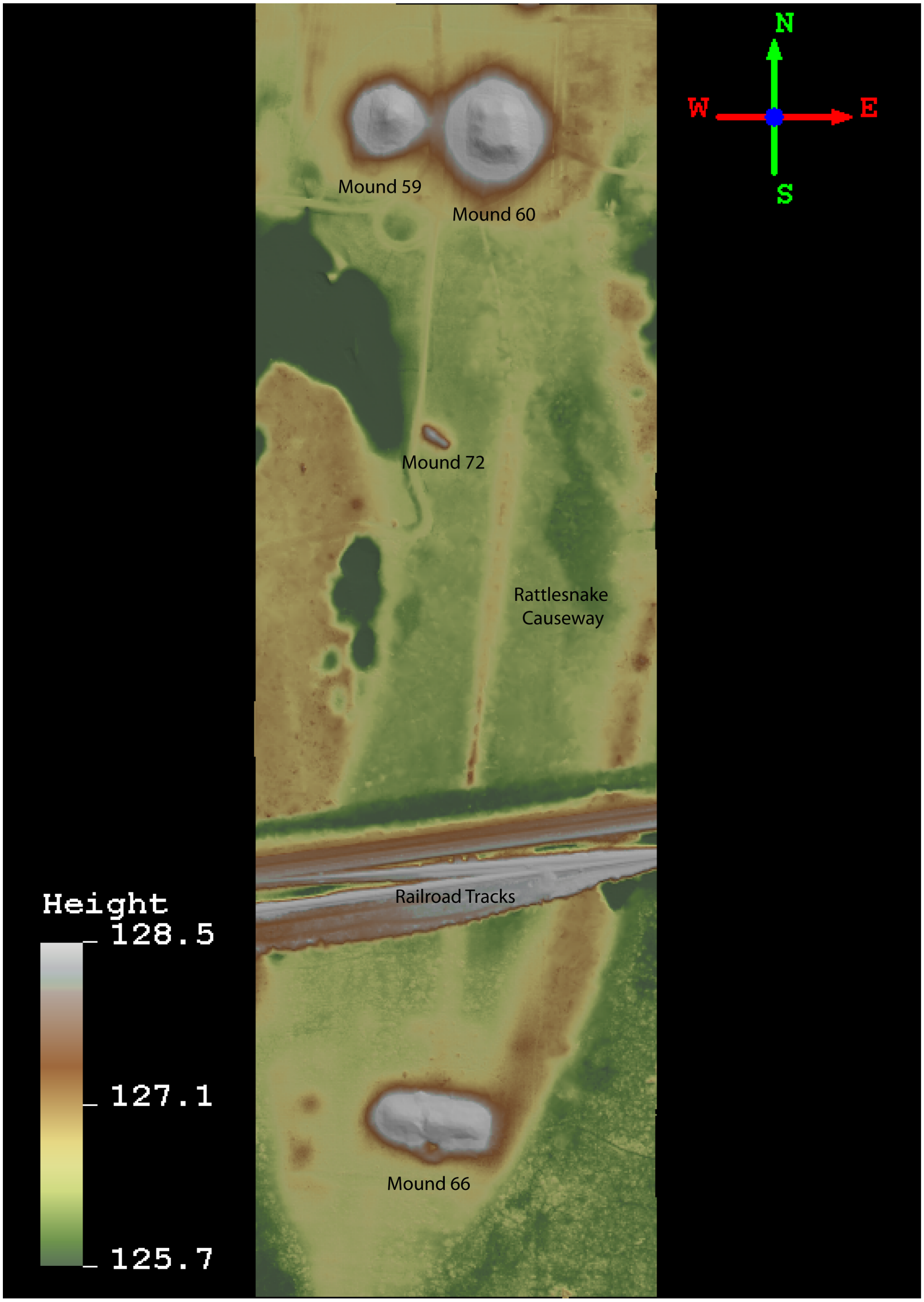


Figure 2.6 Southern Cahokia Precinct: Rattlesnake Mound, Rattlesnake Causeway and Mound 72 showing elevations of the surrounding landscape (original LiDAR image courtesy ISAS)

TABLES

	Floodplain	Uplands
Zones	river, floodplain forest, lake, slough, pond, bottomland prairie, oak-hickory	talus, alluvial fans, bluff edge, interior uplands
Lithics	river cobbles ,minerals, sandstone	limestone, chert, salt, glacial till, limonite
Clays	montmorillonite clays, gumbo	Shales, clays in streambeds
Flora	willow, cottonwood, maple, box-elder, elm, hackberry, pecan, ash, oak, sycamore, mulberry, back walnut, persimmon, honey locust, cattail, American locust, sweet potato, grasses, knotweed, pokeweed, wild beans, herbs, grapes	oak, hickory, basswood, elm, ash, sugar maple, pawpaw, black walnut, hackberry, butternut, persimmon, mulberry, cherry, red cedar, herbs, prickly pear, grasses, hickory and acorn nuts
Fauna	migratory birds, catfish, sunfish, gar, bowfin, deer, raccoon, fox, bear, bobcat,rodents, turkey, beaver, mink, muskrat, river otter, frogs, turtles, mussels, badger, coyote, wolf,squirrel, gopher, prairie chicken, rabbit, woodchuck, weasel, quail, raptors	migratory birds, deer, raccoon, wolf, fox, bear, bobcat, squirrel, skunk, opossum, turkey, rodents, badger, coyote, gopher, prairie chicken, turtle, rabbit, woodchuck, weasel, quail, raptors

Table 2.1 American Bottom Geographic Zones and Resources (after Betzenhauser 2011; White et al. 1984)

CHAPTER 3

RELIGION, COMPLEXITY, and the NEW ANIMISM

"The easy confidence with which I know another man's religion is folly, teaches me to suspect that my own is also."

-Mark Twain

One evening I struck up a conversation with a local Urbana-Champaign, Illinois activist and friend about relationality, mortuary practice, and Native American ways of being. He recounted an experience he shared with his partner near a creek on Standing Rock Reservation, North Dakota. While walking through the landscape, they gathered rocks exposed and weathered by creek water to bring back to Illinois; however, they did not just extract any rock they came across but picked up the ones that spoke, telling them they were ready to leave this particular place and to make the journey to Illinois in the care of my friend. In other words, the rocks told my friend it was okay to take them home- there was an exchange between persons, both human and otherwise. Continuing the walk along the creek the couple came upon weathered human remains dislodged from their burial place. In response to this encounter they went back to a community Elder to ask what should be done; they did not want to leave the remains out and further expose them to the elements and animals. The Elder told them not to touch the bones, that the bones and the spirit knew where they were going; they were traveling. In response to the community Elder, the couple left the human remains on the creek bed to continue their journey, wherever the waters and the spirit might take them (Tom Garza P.C. 2013).

I recount their experience to put into perspective a disjuncture present in archaeological and anthropological theories that attempt to unpack non-Western religions and practices surrounding death and burial (see for a review Fowles 2013; see also Bowser and Zedeño eds. 2009; Echo-Hawk 1993; Irwin 1994; Naranjo 1995; see also Ingold 2014). As religion is a central component of this dissertation and one of the historically contingent factors related to Cahokia's florescence, the following chapter addresses the many attempts archaeologists have made to discuss animism and to define religion as it is related to politically and socially complex societies. Current archaeological perspectives, with the exception of a few (see again Fowles 2013; also Alberti and Bray 2009; C. Fowler 2004; Pauketat 2013a; Zedeño 2008, 2009), do not allow for an understanding of personhood or agency as attributed to bones, rocks, or any other such 'inanimate' objects. An analysis that allows for the *potential to effect* experience as identifiable in something other than human is typically not believed as archaeologically accessible. I hope to move away from considerations of complexity and religion as cognitively based, and evolutionary and responsive, to considering theories of relational ontology and New Animism in an attempt to better understand how persons relate to and experience their beliefs (following Bird-David 1999).

If we are to continue to excavate Native American archaeological sites and spaces is it not imperative that we look toward alternate ways of viewing the world to understand what it is that we dig up? Shifting the focus to investigating the relationships among *multiple complexities*, I posit that Cahokia's beginnings consisted of dynamic relationships that included practicing a new religion- one that included new ways of burying the dead, the planning and construction of unique mortuary mounds, and the reorganization of both the natural and previously occupied landscapes. I begin with a discussion of animism, movement, and Native American ontology to foreground relational ways of being and experience as they inform how archaeologists can address the concepts of religion and complexity. I then review past approaches and theoretical perspectives on the topics of religion, ritual, and social complexity. I end with a new way of thinking about a Native North American past that considers the interdigitation (rather than the isolation) of these concepts.

ANIMISM and MOVEMENTS

Animism has a deep history in anthropological theory and thought; this history will be reviewed in the following two sections with particular consideration of its use as an 18^{th} century pejorative term to address the worldviews and religions of 'primitive' persons (see Tylor 1913; see also Bird-David 1999 for a critique). Harvey (2006a: 11, emphasis mine) best captures this sentiment describing current academic theorists and scholars relationship with "the term animism [as] largely *ghettoized* as an example of an early phase of academic thought and of the entanglement of our academic ancestors with colonialism." In this particular section I focus on a Native American perspective that considers animism, in its most basic form, a "community of living persons, only some of whom are human" (Harvey 2006a: 9).

Animism, with this intentionally broad definition, is key to attempting to understand worlds that are ontological different than those of the West. Inherent to the concept of animism is an understanding of relationality, or the idea that all things (which include human and non-human persons), at some level, are entangled and related (Ingold 2006; see also Alberti and Marshall 2009). This definition is different than structural-functionalist perspectives and approaches that examine the whole as composed of multiple interrelated parts, which respond to changes in the environment to stabilize society; animism (and relational ontology) directly incorporates history and the potential agency of persons in various contexts and temporalities as they may affect or generate social change. As addressed in Chapter 1, relationality is entangled with history, and history is embedded in both the built and natural landscapes. This inclusion of history provides another dimension to relational theories that consider not only relationships in the present but also how these relationships developed and changed in relation to the past. Relational ontology and animism in this respect can be generative of social change whereby things, persons and places inform practice and experience and "only exist in relation to other things", temporalities, and histories (Alberti and Marshall 2009: 348; see also Barad 2007). In addition, animism provides for a way of interpreting the 'religion' (the belief in and relationship with spiritual beings and persons [see Hallowell 1960]) of a particular non-Western group or community by allowing for a multitude of possibilities that have the potential to describe how people actively relate to, effect, enact, and change their surroundings, their beliefs, and each other. Religion, from this perspective, takes on an active role embedded within the historical ties to other people, places, things, land, and the cosmos.

In exploring animism and Native American ontology, the divide between 'religion' and 'animism' should become blurred, as these terms are not mutually exclusive. At the heart, I am not concerned with defining these terms or explaining why it is better to use animism as opposed to religion (or vice versa) to discuss Native American ontologies. Instead, I am concerned with the 'doings' and the practices that constitute and give life to these terms (Fowles 2013; Pauketat 2013a). Using the word 'doings' in this context can refer to the movement of earth by many diverse people for the construction of mounds, the burial of multiple disarticulated individuals in a single feature, walking along the Rattlesnake Causeway, and/or the construction and alignment of lived space to the cosmos. It is important to realize that these practices and doings *exist* without the words 'religion' and 'animism'; they existed before these words were introduced to Native North Americans, and as Vine Deloria Jr. (2003: 65-66) states, "[t]he structure of their [American Indian] religious traditions is taken directly from the world around them, from their relationships with other forms of life", not from categorically bounded terminology. As animism describes the processes, relationships and practices of belief and experience, religion provides a context within which to think through such processes; therefore the two terms can both address the *complexity* of belief and practice as opposed to *identifying* belief and practice. It is important to understand that Native

American belief and practice (their religion, as Deloria refers to it [2003]) is and can be all encompassing; it is "a complex variety of powerful beings that imbue the world with mysterious and unpredictable qualities" (Irwin 1994: 26).

Although I am concerned with the role of religion at Cahokia, I do not intend to suggest that all Cahokian persons, throughout time, experienced, interpreted and enacted these particular beliefs in the same way. This variability can be examined at each ridge-top mound, where the micro-scale of analysis reveals the different ways, by different people, that mortuary spaces and events were enacted and interpreted (see also Fowles 2013). This is important to this discussion of animism because it allows for a diversity of practices and beliefs as they are tied to history. The small changes in the ways Cahokian persons envisioned and practiced their religion is the focus of this dissertation and, I argue, these changes were part of the reasons behind Cahokia, the city's, emergence. The addition of a late Stirling phase building at Rattlesnake Mound is a prime example of the variability in ridge-top mound practice. This structure was added after the construction of the ridge-top mound itself and potentially realigned mortuary space to a new orientation; but, at the same time this building was an historical citation to recent practices identified at both Wilson Mound and Mound 72- the burial of multiple disarticulated individuals on top of a decommissioned, rectangular, single-use building (see Chapters 4, 5, 6). This re-oriented mound and building were at once generative of social changes and also were embedded in an historical knowledge of mortuary practice and land use. Further, there is evidence to suggest that the persons who built this structure and buried their dead may have included immigrants to Cahokia (see Chapter 5). All this to say, religion at Cahokia, was complex and intertwined with history, different persons, and both the natural and social landscapes.

In addition to considering the diversity of people and practices at ridge-top mounds, one must also acknowledge the presence of 'other-than-human-persons' (see Hallowell 1960). Other-than-human-persons are not ethereal spirits (in the Tylorian sense) so much as they are actual persons with agency and the ability to effect change (see Harvey 2006b). Such 'persons' were discussed by Irving Hallowell (1960) who, through his extensive work with the Ojibwe (located along the Berens River in Canada), recognized that the "essence of an understanding of…animism is encapsulated" in the recognition of the presence of these other-than-human beings (Harvey 2006a: 12). As Harvey (2006a) points out, one of the problems with discussing the experiences of the Ojibwe, for example, is in the failings of European languages; we (Western academics), Harvey states, do not necessarily have the terminology to adequately discuss the personhood of these other-than-human persons and therefore do not effectively incorporate such persons into discussions of alternate ontological views. An understanding of Native American 'religion' calls for a broader interpretation of what it can mean to be a person. It requires an extension of agency to all things, but not necessarily all the time (see Fowles 2013). This extension of agency may be readily visible in the thousands of marine shell beads buried with the many disarticulated dead in Wilson Mound, for example. These shell beads (both finished and unfinished) may have had the potential to bring forth the watery underworld (see Claassen 2011; Chapter 6).

Again, I emphasize that blurriness between the words religion and animism. Ultimately, the words themselves are not as important as the actual practices, places, and persons, which are luckily recoverable archaeologically. Animism, from this perspective, may help in understanding and reconstructing the relational qualities of archaeologically recovered Native American sites, persons, and things. If we (archaeologists) continue to excavate Native American lands, places, and communities we must attempt to understand such recoverable materials, households, and monuments as *other-than-human persons*. More simply, an archaeology of Native America should be concerned with relationships. In particular reference to the city of Cahokia, animism (or religion) and a re-consideration of the things people *do* and *how* they do them may provide a new lens with which to discuss the relational complexities of the natural landscape, earthen mounds, mortuaries, and the dead as they are related to Cahokia's emergence and had the potential to effect change.

In order to best attempt such an interpretation of a Native American past, we must also consider Native American beliefs and practices as described and discussed by persons like Black Elk, Vine Deloria Jr., and others who have provided necessary critiques of the boundary between Western and Native American understandings of belief and being. Chief Walking Bear, in an early 20th century response to U.S. government enforced proselytization describes his community's beliefs and practices (Echo-Hawk 1993: 36):

> We saw the Great Spirit's work in almost everything: sun, moon, trees, wind, and mountains. Sometimes we approached him through these things. Was that so bad? I think we have a true belief in the supreme being, a stronger faith than that of most of the whites who have called us pagans…Indians living close to nature and nature's ruler are not living in darkness.

This quote conveys the implicit relational quality of Native American belief and practice citing the importance of place, persons, and the natural landscape, not to mention the divide present between 'Western' and Native American ways of being. Similarly Black Elk states, "[f]or I was seeing in a sacred manner the shapes of all things in the spirit, and the shape of all shapes as they must live together like one being" (as quoted by Neihardt 1998: 43) . The environment, so to speak, is all encompassing, relational and important to an understanding of Native American ontology. But, such relationships with the environment are not always peaceful; instead, the "persons among whom we (and all other persons) live are prey or predator toward others.

Respectful (animist) persons must seek ways to eat others with impunity and respect" (Harvey 2006a: 12-13).

Fowles (2013) also recognizes this variability within Native American religious practices (or doings) arguing that persons engage in a multitude of relationships, but that these relationships are not always a heightened form of ritualized practice. The underlying important part of this particular worldview is this negotiation of relationships (see Harvey 2006a; Tawahai 1998). These relationships can be understood as movements (see Irwin 1994; Naranjo 1995; see also Baires et al. 2014) and such movements can take the form of physical journeys and migrations, visions and dreams, or the exchange of materials among persons. Movements negotiate among histories, multiple relationships with persons, who have the potential to include rocks (as discussed in the introduction to this chapter), mountains, earthen mounds, bodies of water, animals, other humans and the upper and lower realms (see Irwin 1994: 27). "The emphasis is on the movements that constitute experience rather than on single persons, places, or things" (Baires et al. 2014: 199).

I bring up movements because persons "embark on numerous journeys" whether short and localized to a particular community, or long and varied in purpose (Baires et al. 2014; see also Blaeser 2003). Movements, as Naranjo (1995) states, are central to Native American experience and recount how people came to be who, what and where they are. When describing such movements as migration or pilgrimages, Naranjo (1995: 248) emphasizes, "the primary focus of each story is movement—movement in general." There is an understanding that the participation in such movements also entangles (a la Ingold 2010) the participant into a broader relational field of persons (which can include human, other-than-human, the landscape, and the built environment). This 'relational field', more simply, can refer to the environment; but not as something static and natural, but as something all encompassing and alive (see

Harvey 2006a). Additionally, movements in pre-Columbian Native North America have been discussed as the physical process of dream and vision quests, as part of the transference and burial of human remains, and as part of pilgrimages and migrations (see Baires et al. 2014; Baires 2014; Howey 2011; Naranjo 1995; Otelaar 2012; Pauketat 2013a).

Such movements have also been identified as ways persons interacted with the cosmos; certain pathways, causeways, or trails may physically presence the cosmos on earth, transporting person(s) simultaneously on earth and within the celestial realm (see Chapter 5) (see Blaeser 2003; Hall 1997; Momaday 1968, 1969). Importantly Irwin (1994: 59) states,

> [T]he character of both space and time in Native American religious topology is relative and elastic. A direction is not something to be measured…[in a] rigidly fixed, three-dimensional spatial grid…[a] revered mountain or butte stands as a stable but relative feature…the individual moves in relationship to the more stable features of the environment…the lived world of ritual movement, [is a] multidimensional visionary experience.

This particular statement recognizes and emphasizes the underlying relationality of Native American ontology. What is important is not what we call it, but the understanding that practices, events, ways of life, the environment, persons, belief, and being are all entangled; they are all relational. From that entanglement can come the stuff, the practices and doings, that create places like Cahokia, and things like mounds, burials, and causeways.

This brief discussion of animism and Native American ontology provides the context for the remained of this chapter, which reviews anthropology's history with religion and concepts of complexity in particular relation to analyses of pre-Columbian Native North America. From these reviews comes a perspective that rethinks how archaeologists address questions about complexity in the past drawing heavily on what has been called the 'New Animism' redressing such perspectives as presented above with conclusions that are "bound to be complex" (Bird-David 1999: 79).

RELIGION

Religion is a heavily weighted term with ties to the ethereal, the spiritual, the afterlife, and a whole plethora of gods and goddesses attributed with vast responsibilities and control over human existence. The concept and the term *religion* is multi-layered and continuously changes, so much so that recent scholars (see Arnal and McCutcheon 2013) wonder if this word is even useful for describing such divergent practices and beliefs. Further, in studies such as this, it is valid to consider the relevancy and application of a term with post-Reformation Western roots to the study of something so multi-faceted as Native American ontology. To illustrate this point I cite Vine Deloria Jr. (2003: 194):

> Religion dominates the tribal culture, and distinctions existing in Western civilization no longer present themselves…Theology is part of communal experiences needing no elaboration, abstraction, or articulation of principles. Every factor of human experience is seen in a religious light as part of the meaning of life.

Deloria's distinction between Western civilization and tribal culture focuses not on the word religion so much, as the activities, relationships, and deeper meanings attributed to such a word. What comes across is the criticism of the western version of religion-this sense that religion and people's practice are in opposition to one another. Deloria emphasizes that this is not the case for American Indian beliefs, and quoting multiple individuals from Chief Joseph to Sitting Bull argues that for "the Indian" there is no such thing as a separate religion to be practiced in specific places at specific times, but rather there is just belief and being (2003: 197-199).

Attempts to define "what religion *is* can[not] avoid at least partially explaining what religion *does*, where it comes from, and how it works" meaning, religion as a concept is not useful unless we consider the context, practices, and histories tied to it (Arnal and McCutcheon 2013: 18, emphasis original). But, do we need a definition in the classic sense of the word? Isn't it imperative that we delimit exactly what religion is prior to going out and 'finding it'? I would argue, that rather than having an *a priori* definition of such a term it is more useful to think through the historical contexts within which such practices to-be-deemed religious were utilized; it is more useful to think through the effects of, and relationships among religious practice, beliefs and life- the stuff that makes it complex. In some contexts (see Deloria 2003) the attempt to separate religion from every other aspect of social life is not a useful approach to studying the past, especially when addressing historically important events such as the emergence of one of the largest cities in Native North America where religion, as a thing, did not exist prior to European conquest and conversion.

Although we use the word religion to define what it is that accounts for the burial of bodies in unique ways, the construction of large monuments, and in some cases the rise of complexity, it is not the word religion we are concerned with but the *historically contingent practices* that are important. In addition, religion is never a singular thing, but rather ideas, beliefs, events, and concepts 'bundled' with a multitude of other things (see Pauketat 2013a). One cannot think about the construction of a 'religious' building, mound, or temple without also acknowledging the various relationships incorporated into such actions. Religion is never isolated from the rest of human experience, so when attempting to define religion, one must also consider its historical context.

In order to parse the unique relationship anthropologists and archaeologists have with religion, it is important to consider previous anthropological discourses on the subject. These include functionalist, animist, evolutionary, and structuralist theories that focus on definitions of religion and the adaptive purpose of a system of beliefs as correlated to the primitive stages of human existence (see Durkheim 1915; Eliade 1957; Geertz 1957; Marx 1992; Tylor 1913; see also, Arnal and McCutcheon 2013; Fowles 2013; Harvey 2006a, b; Pauketat 2013a for a review). These early perspectives, some developing out of the Enlightenment, set the tone for religious study, one attributed with isolating religious belief and practice from every other aspect of the social world, limiting it to a relatively static and functional category. Inherent in this methodology was a distinction between religion, as a way to explain the unexplainable, and science, as a way to provide answers to questions of human existence through rigorous methods and testing. Ultimately, "no statement about what religion *is* can avoid at least partially explaining what religion *does*, where it comes from, and how it works", and it is the 19th and 20th century definitions of religion that seem to have constructed our current ways of theorizing this topic in archaeological research (Arnal and McCutcheon 2013: 18, emphasis original).

Defining religion is almost always the first step taken in any study concerned with the belief in supernatural or otherworldly beings; this desire to define and categorize can be traced back to David Hume's intellectualist approach to partitioning science and religion into distinct categories (Arnal and McCutcheon 2013; see Morris 1987). Importantly, these biases toward religion as a lesser or naïve method of attempting to understand the world became the building blocks for 19th and 20th century anthropological and sociological definitions of the term. Coming out of this approach, Edward Tylor's (1913) perspective on primitive religion, or animism, focused on animism as a sort of 'hold-over' from a more primitive time; one that would disappear in light of scientific discovery and explanation.

Tylor's "minimum definition of religion, [as] the belief in Spiritual Beings" was simplistic and developed from his characterization of a primitive belief and conceptualization of ghosts made by "the lower races" (Tylor 1871: 383-387 as cited by Arnal and McCutcheon 2013: 19). Harvey (2006b: 6) summarizes Tylor's perspective as follows, "[r]eligion is an animist mistake about the nature of the world in which people 'believe in souls or spirits' or discourse about non-empirical beings"; animism was a way to explain the unexplainable, and once primitive humans were exposed to scientific fact, animism and religion would be abandoned for rationalist thought.

Animism thus became a stage in the evolution of human culture, as well as a tool used by some to discriminate against particular communities of 'primitives' who did not yet buy into or have the ability to contribute to rationalistic science. From this perspective Tylor focused on three progressive categories of thinking about human nature: magical, religious, and scientific (Arnal and McCutcheon 2013). J.G. Frazer (1933), in his treatise on magic and religion, *The Golden Bough*, similarly regarded religious belief and practice as part of a progressive sequence of the human intellect, where religion is just a particular way of explaining the world in the absence of science or more 'progressive' intellectual thought (see also Arnal and McCutcheon 2013; Harvey 2006b).

Deviating from this idea of religion as a stage in the 'progression' or 'evolution' of a community (although he pays homage to Frazer early on in the text), Emile Durkheim (1955) in his famous publication *The Elementary Forms of Religious Life,* focused upon the functions of religion in society. He (1955: 52) classically separated religion from all other aspects of social life stating,

> [a]ll known religious beliefs, whether simple or complex, present one common characteristic: they presuppose a classification of all the things, real and ideal, of which men think, into two classes or opposed groups, generally designated by two distinct terms…profane and sacred. This division of the world into two domains, the one containing all that is sacred, the other all this is profane, is the distinctive trait of religious thought; the beliefs, myths, dogmas and legends are either representations or systems of representations which express the nature of sacred things, the virtues and powers which are attributed to them, or their relations with each other and with profane things.

His categorical analysis of religion was not concerned with the concept as such, but rather with its designation as 'set apart' from all other things. In that action of setting something apart, it then becomes sacred as well as a symbol of the group it is apart of; "that is religion is defined by its *social function* rather than by any distinctively religious content" (Arnal and McCutcheon 2013: 22, emphasis added).

Ultimately, Durkheim (1955: 216-219) was interested in the social functions of religious belief, incorporating his study of totemism into understanding how religion both creates and symbolizes the whole. Religion, through totemism, is a communal activity where society continuously recreates itself, "[t]otemism thus has two sides: it is a mode of social grouping and a religious system of beliefs and practices" (Malinowski 1952:20). Rituals become a part of this circularity, organizing time and space in relation to religion where the totem is understood to be a representation of the group itself, underwriting the clan and setting certain aspects of life apart from others while continuously recreating (through ritual) itself (see Alan and McCutcheon 2013; Harvey 2006b; Pauketat 2013a).

Mircea Eliade (1959) shares a similar perspective with Durkheim, continuing to divide the sacred and the profane to understand the ultimate structural nature of society and man as different- visibly, experientially, and conceptually. To live in the sacred employed acts of ritual performance within these socially bounded spaces, where action structured sacred space and sacred space structured action. Eliade (1959: 30 emphasis original) emphasized 'cosmicizing' space where the sacred "reveals absolute reality and at the same time makes orientation possible; hence it *founds the world* in the sense that it fixes the limits and established the order of the world." Eliade's perspective, although importantly cites the relationships among belief, space, and man, ignores historical context and focuses instead on the structuring of society as key to maintaining an ordered hold on one's place in the world (see also Fowles 2013; Pauketat 2013a).

From a Freudian perspective, religion- where people see "spirits and demons as only projections of man's own emotional impulses"- could also be interpreted as functional (Harvey

2006b: 10, citing Freud 1913: 149). The purpose of such projections is to create a personal reality contextualizing one's relationships with other persons and with 'being in the world' (Harvey 2006b: 11; see also Alan and McCutcheon 2013). Similarly, Malinowski (1952) identified that 'primitive religion' was a functional response to "life crises by positing the presence of supernatural spirits and realms" (Fowles 2013: 20). Malinowski's pejorative analysis of the 'tribal natives' progression from a religious explanation of the "transcendent world" to magico-ritual practices (seeing in magic something akin to science) demonstrated the progression of human kind from believing in the explanatory power of myth to ultimately understanding the cause-effect relationship of science (Fowles 2013: 14). For Malinowski, religion functioned as a 'stepping stone' to rationality. Additionally, Karl Marx (and Engles 1957) theorized religion as a vestige of a more primitive time, something that obstructed the view of the masses, became a product of the state (ideology), and a method to control a populace; only in the abolishing of an unjust society would the need for religion too be abolished (Morris 1987).

The classic anthropological definition of religion is Clifford Geertz's (1993[1966]: 4) systematic approach to the topic:

> Religion is 1) a system of symbols which acts to 2) establish powerful, pervasive, and long-lasting moods and motivations in men by 3) formulating conceptions of a general order of existence and 4) clothing these conceptions with such an aura of factuality that 5) the moods and motivations seem uniquely realistic.

This five-point definition distinctly joins religious belief to symbolic systems with tangible representations and acts (or rituals) visible in the material world. For Geertz (1957) symbolic systems represent an ordered understanding of society, one that manifests in a particular form or practice creating a particular world-view, culture, or reality. Religion as a system explains the unknowable, linking the world-as-lived and the world-as-imagined through ritual practice and symbolic representation. Geertz (1957: 424) argues that "[f]or those who are committed to it [religion], such a religious system seems to mediate genuine knowledge", structuring how a life must be lived. If religion is classified as any symbolic act then it should be identifiable in the material world and read and interpreted as a text structuring societal practices and norms, which then in turn restructures religious belief and practice (see Pauketat 2013a: 14).

This idea of religion as composed of a system of beliefs and ritual representations of those beliefs as distinct from other parts of the lived world is a common thread amongst anthropological analyses of religion (see Durkheim 1955; Geertz 1957, 1993[1966]). The rites or rituals associated with a particular belief system are the tangible and malleable components that through their continuous practice functioned to maintain a society. Arnold van Gennep's (1960) rites of passage exemplify this idea where the construction and balance of society is maintained through particular ritual practices- the focus is not on the individual per se, but rather the reconstitution of the whole (see also Pauketat 2013a). Similarly, Marcel Mauss's (1990) *The Gift* focuses on the reciprocal act of gift giving citing its necessity for the continuation of society. What is most interesting about Mauss's theory is the identification of the importance of personhood and spirits in this practice of gift giving-anything (or anyone) can give a gift or receive one where "persons are relationally constituted" through the ritual of gift exchange (Harvey 2006b: 14).

Talal Asad (1993) posits two important critiques of these various post-Enlightenment attempts to theorize religion. The first recognizes that there is no consideration of human (or other-than-human) agency in discussions of religious belief and practice as imagined by such post-Enlightenment scholars and the second (and possibly most important) is the lack of a historical context. Let's take Geertz's five-point definition of religion as a symbolic system; Asad (1993) challenges this perspective arguing that symbols do not alone construct society, but rather they are sets of *developing and changing relationships* based in a historical context. These symbols do not act independently, as Geertz may have implied; symbols are part of embodied practices where actors make choices to perform a particular act as part of a particular religious experience. Understanding that there is 1) choice and 2) historical context allows for divergent theories, beliefs, and practices of religion that prior to Asad's critique were generally not accepted. Religion is not some never-changing monolithic entity, but rather it is composed of multiple beliefs and practices with particular variations that are historically contingent, and bundled with (rather than establishing) "moods and motivations of men," women, and other-than-persons, too (*sensu* Geertz 1966).

For Asad, an attempt to come up with a universalist definition of religion is unproductive and instead Asad highlights the historically contingent characteristic of religion as constructed by human/non-human action. But, if we take this post-Reformation perspective of religion and apply it "willy-nilly", to use the words of Fowles (2013), to non-Western communities is it a truly accurate method to parsing through beliefs and practices that developed independently from our own Western religious baggage? Should we instead attempt to leave our own preconceived notions of religion as individual, private and separate from every other aspect of social life at the proverbial door?

This brings me back to theories of animism, although not Tylor's (1913) 'primitive' animism, but rather what was discussed at the beginning of this chapter (see Harvey 2006b; following Hallowell 1960; and Bird-David 1999). This 'new animism' is concerned with understanding the relationality amongst persons, which include other-than-humans and humans; this also seems a bit more appropriate to a discussion of Native American ontology when we think back to the anecdote I presented at the beginning of this chapter. New animism allows for an understanding and analysis of beliefs (like the ability of bones to travel of their own intentionality and accord) that cannot be accounted for with post-Reformation Western theories of religion. Animism, once separated from the baggage created by European anthropologists and their notions of religion, primitivism, rationality, and science becomes an entirely new way of looking at and experiencing the world; one more inline with the quote cited at the beginning of this chapter by Vine Deloria Jr. where there is *just belief and being*.

So much of anthropological and sociological thought has been devoted to the deconstruction of religion, especially the religion of non-Western 'primitive' groups seeking rational explanations for behaviors, actions, practices, and belief systems often at the expense of the practitioners themselves (see Asad 1993). The racist undertones of anthropological theorizing have bleed into our ability to parse through (without biases) ontologically different ways of living in the world, leaving in our wake attempts to categorize, dichotomize and restructure other people's experiences in ways that support our own preconceived notions of order and rationality. Again, Vine Deloria Jr. (2003) criticizes this methodology citing the Westerner's (read anthropologist) need to separate religion as a distinct and foreign practice to American Indian belief, which instead focuses on the relationality and materiality of things. It is this relationality and 'new animism' that I turn to as a means to understand the ways Native North American's relate to other people, their surroundings, and the cosmos, and to think through how/why a city such as Cahokia was built. But first, I must revisit archaeological approaches to the study of religion in order to situate how a relational ontological and 'new animism' approach present a more productive way of thinking through belief in the past as it is related to political and social 'complexity'.

Joshua Pollard (2009: 335) suggests that one of the reasons archaeology has struggled with the concept of religion is because of a "lack of confidence in accessing systems of belief, which traditionally were perceived as too dislocated from an evidence base" to be accessible archaeologically. Pollard (2009: 335) posits that a focus on "practice-based and materially engaged" approaches to religion, characterized as a "knowledge-creation process", is most productive when attempting to parse the relationships “between, thought, action, and the material.” Similarly, Emerson, Alt and Pauketat (2008) ague for an approach to the study of religion that considers the diversity of practices and the processes of religion as people lived them, rather than attempting to identify religion as a structural system. Recent perspectives on the archaeology of religion (and ritual) also cite the need to ‘decode’ the concept, recognizing that the word ‘religion’ covers “a variety of phenomena tightly embedded within specific historical circumstances” (Hodder 2010: 13). In this same vein, Neil S. Price (2008: 145) argues that instead of attempting to apply the concept of a “formal religion” onto the prehistoric past it might be more useful to “speak of a ‘belief system’, a way of looking at the world [as] simply another dimension of daily life, inextricably bound up with every other aspect of existence.”

This small sample of recent perspectives suggests that archaeological inquiry into ‘religion’ is changing, moving away from functionalist, structuralist, and evolutionary models to consider instead historical context, agency, and relationality (see Fowles 2013; Pauketat 2013a). Such studies are not particularly concerned with religion as a system of beliefs, but rather with what constitutes religion-the people, the practices, and the places as part of ‘bundles’ or ‘doings’ (see Fowles 2013, Pauketat 2013a). This perspective draws upon object biographies, animism, alternate ontology, agency, personhood, and materiality to attempt a “relational artefact classification within the limitations afforded by the very nature of archaeological deposits” (Zedeño 2009: 410; see also Alberti and Bray 2009; Chapman 2000; C. Fowler 2004; Gosden 2005; Meskell 2004).

Moving away from an archaeology of religion based in classificatory systems to an archaeology of relationships does not mean that archaeological methodologies must change, but rather the analytical framework of fieldwork and analysis must change. Zedeño (2009: 410 emphasis original) espouses methodological frameworks that focus on identifying the “system of ontological relationships that underlie the formation of certain artefact assemblages- *a relational taxonomy."* Such taxonomy recognizes that people make things "with complementary properties and relational capabilities" and that these relationships are recoverable when archaeologists alter analytical frameworks to not only identify 'unique' objects but to also focus on the depositional contexts (Zedeño 2009: 410). Again, to quote Price (2008: 146), an archaeology of relationships necessitates a change in the dichotomy that exists between religion (belief) and knowledge- we must abandon this structure and understand that *to believe is also to know*. Religion as knowledge is inherent, not something distinct and set apart, but continuous and part of every day life. This is why Deloria (2003: 210-212) argues that Native American's will always be part of the 'tribal church', that it is a fundamental aspect of being 'Indian'. Such a perspective, I would argue, is useful when attempting to parse ontologically different pasts concerned with relationships and experiences; but, there needs to be a word of caution. "[A]ll other so-called premoderns do not maintain, day in and day out, the same heightened consciousness of the networks that link nature and culture together into a single natureculture"; there can be variability among practices, which does not mean some practices are more or less 'sacred' than others, but rather "they are distinguished…by the extent to which they mark and make explicit the mutual entanglement of people, things, and cosmos" (Fowles 2013: 103-104). Again, think back to the anecdote presented at the start of this lengthy discussion-not all rocks spoke to my friends, just the ones who in that moment were ready to move on.

Prior to the relational approaches to an archaeology of religion as presented above, archaeology was typically concerned with materialist representational methods used to decipher beliefs as a functional response to changes in economic, political, or cultural systems that by and large ignored human actors and historical contexts as relevant to understanding such changes over time (see for a review Emerson 1997; Emerson and Pauketat 2008; Fowles 2013; Pauketat 2013a). Archaeological investigation typically focused on the role of religion as "explaining the evolutionary progression from human origins to the rise of theocratic regimes (i.e. the rise of the archaic state)" (Fowles 2013: 30). The 1990s marked a period in archaeological research that concentrated on two distinctive roles of religion in the human past: the functional and the "Marxist" (Fowles 2013). Colin Renfrew (1994: 50) identifies both of these approaches arguing "early 'functionalist' views saw religion as useful in ensuring the smooth functioning of society by ensuring some considerable degree of community of belief [and] some acceptance of the social system" while "[w]ithin the Marxist view…religion is viewed as a means, developed by the elite, for the manipulation of the masses." Religion in the archaeological context could only be one of two things: functional or ideological. Additionally, archaeologists like Renfrew (1985, 1994) and Hodder (1982) saw religion (and it's counterpart ritual) as something archaeologically identifiable using trait lists (derived from Geertz's and Durkheim's definitions of religion) where a particular item or place was identified as unique, ritual, or religious because it fit into some categorical representation of the non-functional.

Such perspectives engage with an evolutionary approach to the study of religion, not unlike our post-Enlightenment theorists who emphasized the role of religion (functional or ideological) in the progression of humanity from small-scale communities to large, socially and politically complex societies (see Fowles 2013; Smith and Schreiber 2006). There is an understanding that the role of religion in these two types of societies is mutually exclusive, where one function of religion is distinctively unique from the other. This is a misunderstanding that attributes the varying roles of religion in society as becoming more 'complex' as society becomes more 'complex' and in this way archaeology seemingly reproduces 19^{th}-20^{th} century interpretations of religion, limiting viewpoints to an evolutionary perspective only (see Fowles 2013: 30-31).

Following this format of religion as ideological or functional has led to a perspective that considers religion as based in a frame of belief and practices with correlated material representations identifiable in the archaeological record (Renfrew 1985). By this, I simply mean that archaeologies of religion are also archaeologies of ritual where the identification of 'special' practices (rituals) and associated materials are used as representations of the more ethereal and intangible belief systems. Renfrew (1985: 24) identifies three steps in identifying "contexts from the very outset as sacred or religious" by establishing a "cult assemblage" with "specific symbols as carrying a religious meaning" that can then be applied across contexts to accurately identify certain shared practices and beliefs. This approach follows a Geertzian model, one that identifies symbols as markers of a particular system of belief and practice. This perspective assumes that religion, as a construct, is universal and static where "religion does not truly evolve; rather it is religion's relationship with other aspects of human experience…that changes" (Fowles 2013: 31).

This approach is echoed by Fogelin's (2007; see also 2003; see also Insoll 2004) more recent publications on the relationship between ritual, religion and archaeological inquiry. Fogelin (2007: 56) argues "[t]here is a widespread archaeological understanding that ritual is a form of human action that leaves material traces, whereas religion is a more abstract symbolic system consisting of beliefs, myths, and doctrines." Such a perspective assumes a dichotomous understanding of the past, one that separated ritual from religion and structured society, people, and action (see also Bell 1992). What Fogelin does not address in his examination of religion and ritual is the role of context and history as well as agency; his perspective emphasizes the behavior and symbolic meaning over the choices and historical contexts that are equally, if not more, important than identifying ritual symbolism.

Brück (1999: 316) importantly critiques archaeological analyses of religion and ritual as espoused by Fogelin (2008, 2007, 2003), Renfrew (1994, 1985) and others (see also Leach 1964; Radcliffe-Brown 1922) arguing that such perspectives mobilize particular characteristics of ritual as repetitive/structuring, or expressive/symbolic. This perspective neglects to address the argument that ritual is "not done solely to be interpreted, it is also done…to resolve, alter or demonstrate a situation" where the emphasis is placed not on the practice itself but rather it's relation to the social and historical context it is embedded within (Lewis 1998: 35 as cited by Brück 1999: 32). A dichotomization of ritual and secular practices comes out of post-Enlightenment thought, not unlike the theories of religion discussed above, "in which a scientific logic is prioritized as the only valid way of knowing the world" (Brück 1999: 317).

I would argue that this perspective of dichotomizing ritual and secular practices, of which archaeologists consistently utilize, just serves to reify the argument that religion (and its ritual counterparts) can only be studied as distinct and separate from every other aspect of social life. Again, Brück (citing Barrett 1988, 1991 and Hill 1995) emphasizes that we (archaeologists) must not assume that a certain behavior is tied to a particularly ritual or functional category and outcome. In fact, the designations of ritual, religious, functional, and secular are not particularly useful when attempting to decipher past practices embedded in a non-Western tradition. Lets take for example, the Pawnee practice of maintaining and curating a buffalo skull and sacred bundles inside a family home like any other 'domestic' or non-ritual object. The location of the bundle does not negate its importance, but rather emphasizes its interrelatedness to multiple realms of social life (see Weltfish 1965; Baires and Baltus 2012). This perspective ultimately challenges the use of categorical analyses that identify particular ‘ritual’ practices or objects, separating them out of the historical context within which they are embedded.

Also important to an examination of the archaeology of religion is the use of the direct-historic approach (or ethnographic analogy) when attempting to decipher religious beliefs and practices in the past. This approach is commonly utilized by Southeastern Mississippian archaeologists who consistently draw upon ethnographic accounts of Plains, Southeast, Southwest, and Mesoamerican societies to draw correlations among religious ritual practices and meaning in the archaeological record (Brown 2003, 2007; Hall 1997; 2000; Kehoe 2007; Knight 1986; Lankford 2007; Peregrine 1996; Reilly 2007; see also Chapter 4). This representationalist approach (beginning with Steward 1942) draws on two perspectives: the generalizing and the specifying. Broadly, both perspectives make comparisons of behaviors and practices that share some underlying similarity. In a generalizing sense, “if some practice or experience of people in one part of the world was comparable to those of the group under study, then one might infer that the two shares some additional features as well” (Pauketat 2013a: 15).

The specifying approach, or the direct-historical method, attempts to discern religious meanings from the past by assuming a link among geographically and historically related peoples. For example, from a direct-historical perspective the use of a particular figure or symbol in both prehistoric and historic contexts suggests that the meaning of that particular symbol or figure remained static over time and represents a shared system of beliefs (Brown 1997; see also Pauketat 2013a; Renfrew 1985). When used in conjunction with the archaeological record and not as the only method of analysis, such approaches can prove as useful starting points in an analysis of iconography, practices, and beliefs that have some counterpart in an ethnographic context (see Hall 1997). The problem is not with utilizing this approach as a starting point of analysis but rather when such a technique “homogenizes what was certainly a diversity of beliefs into one view” (Pauketat 2013a: 16). The direct-historical method then becomes another means of colonization (following Pauketat 2013a; see also Atalay 2006), where pre-Columbian peoples are not allowed to ‘have’ their own religious beliefs, but instead archaeologically recovered religious ritual materials and practices must fit into pre-determined categories as identified by the archaeologist.

This perspective and approach to identifying religion in the pre-Columbian past importantly also underlies the identification of the Southeastern Ceremonial Complex (SECC)- a monolithic pan-southeastern religious belief system thought to have tangible, material correlates recoverable from various Mississippian sites throughout the Midwest and Southeast (see King 2007, and Reilly and Garber 2007 for reviews). First recognized and described by Antonio Waring and Preston Holder (1945), this complex included ‘exotic’ materials and iconography from Mississippian period (1100-1400 AD) sites like Etowah (Georgia), Moundville (Alabama), and Spiro (Oklahoma). Such items shared similar motifs supporting the hypothesis that “there existed in the prehistoric Southeast a highly-developed cult or cult complex, integrated with and fundamentally dependent upon a horticultural base” (Waring and Holder 1945: 31). Additionally, characteristics of this cult complex included that the materials (and their associated beliefs) were restricted to a single community or group that then spread out across tribal boundaries, with local variations springing up in conjunction with the original items (Waring and Holder 1945: 31). King (2007: 4) additionally cites Griffin’s hypothesis that the SECC was “the ceremonial culture of the Mississippian period” directly connecting the emergence of Mississippian sites and cultures to the creation and use of particular sets of ceremonial objects. With influence from the New Archaeology, Brown (1971) argued that SECC objects were likely markers of highs-status and political leadership moving studies of the SECC away from the ‘cult’ complex to understanding how such materials functioned within a hierarchical social system (see also Peebles and Kus 1977). Importantly, Brown (1976) identified what he thought were "three organizational networks of social power" that operated in Mississippian hierarchical societies: cult paraphernalia, conceptual core, and mortuary temples (King 2007: 5; Brown 1976). These three components focused on the role of art objects in the SECC 'interregional interaction sphere' which inherently impacted the relationship between emerging 'chiefdoms' and religious beliefs by associating materials with elites and political leaders (Brown 1976; see also King 2007).

Building on Brown's (1971, 1976, 1997) approach, Knight (1986) identified SECC materials as the basis for Mississippian religious beliefs and ritual activities by also associating various cult groups to particular practices (e.g. ancestor veneration) and hierarchical organizations (e.g. priesthoods). Adam King (2007: 7) highlights Knight's approach as "landmark" citing his avoidance of trait lists, like those previously employed by Waring and Holder (1945), to identify shared symbols and themes; however, I would argue that Knight's and Brown's approaches *still* employ trait lists, providing sets of identifiable materials (mounds, temple statuary, war-fare related symbols) as marking three distinct cults of practice. Contrary to King's (2007: 10) interpretation that Knight's perspective appropriately places SECC symbols and themes "within the context of an integrated Mississippian religion" his (Knight's and even Brown's) approach instead reifies categories of analysis identifying certain materials and practices as belonging to one of three cult systems, which were identifiable at and attributed to certain archaeological sites.

In 2001, Knight et al. further argue for the use of trait lists in determining which materials and art objects of the 'Mississippian culture' should be included into the SECC, restricting some that they believed did not "demonstrably [relate] to certain core iconographic expressions in certain media." I would argue, that the very act of subdividing certain motifs and materials into SECC categories (or not including them at all) could not accurately account for the roles and uses of these materials in the past. This strategy problematically assumes that such archaeological categories, identified by Knight, Brown, Reilly, and King (for example), were also the lived experience of Native persons.

This definition of the SECC has remained a relevant component in the analysis of southeastern religious beliefs and practices since 1945 with some minor changes to include the importance of 'art objects' and tracing SECC ritual and symbolic themes from pre-Columbian contexts to contemporary Native American oral histories and practices (King 2007: 3; see also Emerson 1997; Galloway 1989; Knight 1986). The characteristics of the SECC were most commonly identified in burial contexts and used to prove that key symbols represented and established certain cults "identified with a mutually exclusive set of artifacts and iconography" (Brown 1997: 480). Additionally, these cults were geographically bounded with variation attributable to a particular archaeological site; but such cults almost all shared a particular set of themes that included the presence of the birdman (thought to have originated at Cahokia) and the circle and cross motif (see Brown 2007, 1997; Kelly et al. 2007; Lankford 2007). James Brown (1997: 481) describes this shared birdman theme as "great continuity of the form in hero representations, the marking in concrete physical terms of various concepts known later, and very rich belief systems that included specific cult practices." To quote Pauketat (2013a: 22) who sums this perspective up best "[t]his is structuralism, a distinctive sort of representational approach." The SECC (although Reilly [2004] now amended the name to Mississippian Art and Ceremonial Complex) implies that Mississippian religion and its associated rituals were monolithic, unchanging systems of belief identifiable in contemporary Native contexts, and traceable back through time to their various archaeological counterparts. This perspective implies a stability of meaning that does not and cannot account for any kind of historical change or human diversity (see Fowles 2013: 102-103).

Does not this definition imply that persons, specifically Native North American persons, are static entities that maintain their particular beliefs and practices throughout time, all the time, even in the face of dramatic changes to their landscape, societies, and people? Is it not problematic to rely on ethnographic accounts, usually written by men, to come up with structural interpretations of Native 'religion' without considering the historical contexts within which they were lived and practiced? Again, I cite Pauketat (2013a: 23):

> Taken to an extreme, such an interpretive process is both circular, with the analog of choice tending to determine which contextual associations are chosen, and top-down, with the expert analyst controlling knowledge of the past…the circularity begins because the analyst must know in advance which historical Algonkian-, Caddoan-, or Siouan-speaking group was the likely descendant population. The top-down character of the approach results because the analyst, interjecting biases and homogenizing practices of the past, presents his or her reading of the past as the most credible one.

Following Pauketat's critique, I would also argue that Vine Deloria Jr. (2003) addressed this point previously asking why archaeologists, and anthropologists, believe they 'know best' when it comes to decoding Native American beliefs (see also Atalay 2006; Echo-Hawk 2009). The point should not be to identify traits in a structural system of religion but rather to attempt to understand how these practices and beliefs articulated with other parts of the social life. This is a much more useful approach to the study of 'religion' in the past because it allows for the understanding that 'religions' and everything that they encompass were historically contingent. How archaeologists attempt to address such questions of relationships, histories, and religion does require explanation.

Melissa Baltus and I (2012) recently explored this question in conjunction with questions surrounding ritual deposition in the Mississippian world. We used the example of a clay pot, citing the relationships created through the various acts- creation, use, and destruction-brought together in the process of making and using such a vessel (see also Baires et al. 2014; Pauketat et al. 2013a). We argued that these relationships were/are recoverable archaeologically through use-wear analyses, clay sourcing, and even GIS-based mapping of the location of the broken vessel on a house or pit floor. Recently, Fowles (2013) also explored this same concept using a clay vessel (a miniature jar recovered from a Tiwa pueblo), and came to a similar conclusion through an analysis of the multiple contexts and practices such jars were used in. Through this sort of 'thick description' (that included mineralogical analyses) Fowles (2013: 105-106) is able to address the multiple relationships this jar was likely a part of, moving beyond the question of 'is this object sacred or is it profane?' to include how people, things, and places become articulated through practice. This requires a new way of thinking that includes an ontological shift in archaeological research to focus instead on the relationships and practices traceable through material remains and the landscape (see Alberti and Bray 2009; Baltus and Baires 2012; Fowles 2013; Pauketat 2013a; Zedeño 2009). This brings me to theories of complexity to think beyond the typical questions, 'is this society complex or not', to considering how people, places, and things are complex in and of themselves.

COMPLEXITY

In addressing the relationships among the built landscape, religion, persons and political and social change I turn to theories of complexity, which provide a context for the discussion of the importance of religion and its role in Cahokia's beginnings. Susan Alt (2010a: 2) recently explored theories of complexity in North American archaeology criticizing macroscale analyses concerned with systems and modeling and instead argued archaeologists "must examine the particular details of any society to truly understand it." Archaeologies of complexity, not unlike archaeologies of religion, are steeped in evolutionary theory where scholars sought functional explanations for the rise of sociopolitical complexity over time; in some cases scholars compared the ‘progressive’ stages of non-Western sociopolitical systems to the epitome of political development, or Western states, to address questions of evolutionary social change (see Flannery 1972; Fried 1967; Sahlins 1968; Service 1962; 1975; see also Alt 2010a; Chapman 2000 for a review). Archaeologists have been at the forefront of research on complexity (and complex societies) modeling systems of behavior and applying concepts from biological systems where complexity “is a relative measure of the number of parts in a system and number of interrelationships among those parts” (Sassaman 2004: 231). Such perspectives that engage with complexity at the level of the system and cultural evolutionary modeling are then applied cross-culturally making comparisons amongst groups at the macroscale of analysis (see Crumley 1987 for discussion; Smith ed. 2012).

In a discussion of complexity, the evolutionary theories of Service (1962, 1975) and Fried (1967) must first be addressed as these perspectives structured neo-evolutionary theories of sociopolitical complexity as espoused by archaeologists like Binford (1968) and Renfrew (1974) (not to mention Earle 1987; Feinman and Neitzel 1984; Flannery 1972; Wright 1984). Both Service and Fried (although disagreeing on the names of evolutionary stages) advocated for evolutionary theories that identified types of societies from simple (band or tribal level) to complex (chiefdom or state level). The definition of such categories consisted of trait lists that cited important characteristics like the division of labor based on sex, the accumulation or inheritance of power by one or more related individuals, and the ability to control labor and to redistribute goods and services (see Chapman 2000: 36-37).

In an attempt to understand the processes of social evolution over time and in archaeological contexts, Colin Renfrew (1974) based his research on the identification of chiefdoms in the neo-evolutionary categorical analyses first espoused by Service and Fried. By establishing a known list of traits, Renfrew argued that archaeologists could identify the material representations of each trait that 'made up' each level/type of society, not unlike his methods to identify religion. This typological method also drew upon ethnographic examples "to discern new patterns in the data" that provided examples of evolutionary change across cultures (Chapman 2000: 39).

Although perspectives on complexity are changing (see Alt ed. 2010, 2010; Hodder 2012; Janusek 2007; Pauketat 2013a), typological cross-comparative categories still inform the bulk of analysis on studies of complexity (see Cobb 2003 for a review; Smith ed. 2012). Such methods for the identification of complex societies in the archaeological record using trait lists and typologies did not and could not account for the amount, or type of variation present among different communities in both ethnographic and archaeological contexts. For example, Chapman (2000: 42-43) cites ethnographic and archaeological work on chiefdoms in places like Hawaii and Melanesia where it was quickly determined that one comparative model of sociopolitical organization was not an adequate measure of sociopolitical complexity in such communities. In response to problems with generalized categorical analyses, archaeologists then further broke down chiefdoms into paramount, complex and simple based on qualities like population, distribution of labor and goods, environmental conditions and control over resources (see Carneiro 1998; Flannery 1972; Steponaitis 1978, 1991; Wright 1984). By adding more traits to identify, the hope was to cast a wider net including more variables of difference to be used in broad cross-comparison studies.

In response to this perspective, (but keeping the comparative aspect) Feinman and Neitzel (1984: 45) opted to move away from typologies to a focus on 'middle-range societies' (societies between the simple band and the complex chiefdom) and four attributes of study: functions of leaders, social differentiation, the structure of political organization, and demography (Chapman 2000: 44). These four characteristics were then assessed based on their degree of functionality distinguishing between weak and strong leaders in relation to control over resources and hierarchical leadership. This perspective maintained a comparative model (see Smith ed. 2012 for review) that focused on identifying processes of social change where the four categories of analysis used by Feinman and Neitzel (1984: 77) were identified "as continuous rather than discrete [with] no clear societal modes of subtypes…readily apparent." Continuing to draw upon cross-cultural comparisons and ethnographic sources to identify shared traits, systems of organization, and functional attributes of leaders in middle-range societies, Feinman and Neitzal (1984: 77-78) highlight correlations between "axes of variation" rather than bounded types/categories.

Other perspectives on complexity are concerned with heterogeneity, inequality and hierarchical modes of organization (see McGuire 1983; Price 1995) where "hierarchical structures (vertical intensification) eventually arose to integrate the increasing number of parts and differentiate among them to alleviate scalar stress" (Sassaman 2004: 232). This perspective of organization is often used to discuss the emergence of hierarchically differentiated chiefdoms or states whose structural transformation (from a heterarchically organized tribe for example) is tied to the intensification of agriculture, for instance (Price 1995; see also Sassaman 2004). Additionally, Flannery (1972: 412; see also Wright and Johnson 1975) argues that the "most striking differences between states and simpler societies lie in the realm of decision-making and its hierarchical organization, rather than in matter and energy exchanges." With this description Flannery (1972: 412) privileges the complexity of hierarchies and politics over more simplistic tasks like "get[ing] their food", where leadership is required to maintain "regulation" over large populations. It must also be noted that this perspective included a focus on environmental stressors as causal to the emergence of complex systems of leadership, ultimately leading to evolutionary change (Flanner 1972: 413; see also Rappaport 1971). These perspectives emphasize the idea of progression "with greater complexity…being equated with progress towards modernity" (Chapman 2000: 5).

Flannery's theory was expanded to consider processes of decision making as "organizational responses" to the need to process more information and to coordinate large numbers of people and activities (Chapman 2000: 47; Wright and Johnson 1975). This perspective also focused on analyses of 'thresholds' as directly related to the scale of the social system; once a particular 'threshold' (e.g. population size) was crossed new organizational responses were required to process and disseminate particular information- thus encouraging the transition from a chiefdom to a state where a state level society (and associated levels of leadership) could more productively control a larger population (Chapman 2000: 47; Earle 1991; Johnson 1982). Similarly, Earle (1991) argued for a focus on political power and strategy emphasizing the organization of regional populations, heritable social ranking, and economic stratification where leaders emerged out of competition to obtain and control power. Important to this perspective is the notion that chiefdoms, as explored by Earle, were no longer considered stepping stones to statehood, but rather were complex societies- "unstable and cyclical"- and could emerge and fragment repetitively (Chapman 2000: 53; see also Anderson 1994).

In response to such perspectives Carole Crumley (1995: 3) posited a theory of heterarchy, which considers "the relation of elements to one another when they are unranked or when they possess the potential for being ranked in a number of different ways." The introduction of heterarchy theory allowed for a consideration of complexity that moved beyond the typical analysis of political or social hierarchies, allowing for flexibility in scale, meaning societies at all 'levels' have the potential to be complex in a multitude of ways that are not mutually exclusive or confined to hierarchical socio-political organization of the kind espoused by Service (1975) and Flannery (1972).

Complexity has also been identified in societies with organizational qualities that include institutionalized labor and inherited status (see Arnold 1996; Price and Feinman 1995). Sources of power for such inherited status leaders include objective and symbolic sources, which serve to legitimate leadership and maintain socio-political structure (Blanton et al. 1996). This approach considered the importance of including both network and corporate models into archaeological analyses that attempt to parse the sociopolitical processes of the formation of 'complex' societies. This theoretical position, although still focused on identifying particular traits and associated behaviors, considered dual-modes of organization or "cycles of long duration alternating between network and corporate emphases" that attempted to move beyond evolutionary models to understanding the varying formation processes of complex societies using behavioral modeling (Blanton et al 1996: 13).

Recently, this consideration of processes employed a comparative framework to identify similarities across complex societies (in particular the state) through time (Feinman 2012). Feinman (2012: 37; and colleagues Fletcher 2012; Smith 2012) does note, however, that no model or cross-cultural comparison can fully account for the variation in processes or "axes of differentiation" without also "considering historical, cultural, and local factors." Such historical, cultural, and local factors, however, are considered *post hoc*, as small and often unimportant details; the real understanding for Feinman (2012: 37) comes from "diachronic comparisons as a primary theoretical component in an overarching framework to study states and their diversity and their cycles of decline and regeneration." As with Blanton et al. (1996), Feinman's (2012) theory is concerned with macroscale processes and comparative studies that consider complex societies as monolithic and structured.

Overall, such past perspectives of complexity fall short in one major way: they lack a consideration of human practice and agency (not to mention other-than-human or even object agencies) and focus on 'complexity' as a series of progressional stages rather than qualities (consisting of experiences, places, things, and persons) of all human societies regardless of their 'type'. Such approaches to the examination of 'complex societies' in the archaeological record presented above importantly inform studies of Cahokia-its interpretation as a chiefdom (or a state) and the identification of hierarchical systems of organization as correlated to displays of 'power over' vested in mound construction, ideological symbolism, control of labor, and redistribution of goods (McGuire 1983; Miller and Tilley 1984; see Alt 2010 for a review). It is these theories that I turn to next in this review of complexity theory.

Perspectives on Cahokian complexity include neo-evolutionary frameworks, in-situ cultural development models, hierarchies, regional-polity models, and cycling chiefdoms (see Cobb 2003; Blitz 2009; Emerson 1997; Fowler 1974, 1975; Holt 2009; Kelly 1991, 1997, 2006; Milner 1998, 1984; Pauketat 1994; 1997; Porter 1974; Steponaitis 1991; see also Alt 2010). There is a general consensus that Cahokia's emergence as a complex society occurred rapidly at AD 1050 (see Pauketat 2007). This emergence included an increase in population size, and the planning, organization and construction of approximately 104 earthen mounds, four constructed plazas, a central causeway, Woodhenge, and a series of neighborhoods, farmsteads, and outposts located in the Richland uplands east of Cahokia (Alt 2010; Emerson 1997; Milner 1998; Pauketat 1994; 2007). Additional changes included the introduction of new types of buildings and construction methods, new pottery styles, the intensification of maize agriculture, and the introduction of specialized material goods (flint clay figurines, Ramey incised pottery, marine shell disk beads)- all of which have been considered unique markers of the Cahokian polity (see

Alt 2010; Emerson 1997; Fowler 1974, 1975; Griffin 1967; Hall 1973; Kelly 1990; Pauketat 1994, 1997, 2007).

Debates surrounding Cahokia's emergence as a complex society typically focus on the reasons and mechanisms of its emergence "identifying stimuli that would have instigated the changes that transformed an agricultural village into a major Mississippian center" (Alt 2010b: 120). Central to this debate, archaeologists have quibbled over whether to distinguish the transitory 'Emergent Mississippian' phase that supposedly marked the threshold between Late Woodland populations and Mississippians as imperative to the in-situ development of Cahokia (see Cobb and Garrow 1996; Kelly 1990). The identification of such a transitory phase is important from a theoretical perspective that focuses on the evolution from Late Woodland village societies to Emergent Mississippians tracing an increase in population size, the intensification of agriculture and the ensuing need for a more complex form of hierarchical organization (see Kelly 1990). Building on this perspective Smith (1990: 2) argues that the Emergent Mississippian phase was a response to the "rapid outward spread of elements of the new cultural complex" where qualities of both Late Woodland populations and Emergent Mississippians are explored as adaptationsit in the face of changing environmental and social conditions (Cobb and Garrow 1996; see also Smith 1990; Welch 1990).

Hall (1967: 179-180) also notes the importance of such a phase, which he calls 'Early Mississippian', "a distinct stage of Mississippian development at Cahokia" that emerged prior to Cahokian Mississippians (during the 10-11th centuries) supporting a theory of in-situ development. According to Hall (1967: 180-181), Cahokia's origins lie in local Late Woodland traditions and include both the dissemination and creation of new ideas. Other hypotheses considered the development of Cahokia as contingent upon outsiders (some from Mesoamerica) migrating to the American Bottom and bringing with them new ideas, materials, and sociopolitical organization that transformed Late Woodland villages into a complex Mississippian society (Perino 1959; Porter 1974; see also Kehoe 2005, 2007). These arguments often cite the presence of certain objects (e.g. Ramey Knives) as evidence that Cahokians had direct ties to Mesoamerican communities; Alice Kehoe (2005) for instance identifies unique similarities amongst Cahokian (and Southeastern) iconography with that of Mesoamerican communities citing trade relationships and the movement of people as important to Cahokia's emergence. In contemporary analyses, this hypothesis has mainly been abandoned as Alt (2010b: 121) states, "it is more commonly thought that Cahokians were the first Mississippians" where it is more likely that Cahokia was part of multiple local processes of change rather than a direct response to outsiders.

If, following Alt (2010b; see also Pauketat 1994; Pauketat and Emerson 1997), the assumption that Cahokia developed as part of a local movement is correct then there must be some causal factors identifiable in the archaeological record. Some scholars point to the intensification of agriculture (Steponaitis 1986) as the motivating factor, others address control over craft production and other sources of labor (mound building) (Kelly 1990, 1997; see also Milner 1998; Peregrine 1992). Still others choose to focus on Cahokia as a product of social evolution that included the progression from local simple village societies to a complex hierarchical chiefdom as well as a natural response to changes in environmental conditions (Fowler 1974, 1975, 1997; Milner 1998).

Pauketat (1994, 1997) proposed that Cahokia was part and product of a "Big Bang"- the idea that a sudden transformation from village to complex hierarchical center took place rapidly ca. AD 1050- negating previous arguments that considered this Mississippian center as a stage in the evolutionary trajectory of human sociopolitical organization. Further, Pauketat (1998: 49-50) argued that Cahokia "was the vortex of an intensive regional phenomenon" that dominated the surrounding landscape and "emanate[ed] out from the political-administrative center" (see also Pauketat and Emerson 1997). This perspective importantly identifies the emergence of Cahokia as something intensive and sudden- a disjuncture of sorts from the previous ways of living for small Late Woodland villages. Additionally, this perspective includes "the notion of political economy…that incorporates considerations of ideology" as mediating change through shared sets of values and the performance of power (Cobb 2003: 65; see also Pauketat 1997). This notion of political economy as invested in a particular ideology is also espoused by Emerson (1997: 190) who argues "that the manipulation of the cosmos by the Cahokian elite to stabilize and enhance their hierarchical position" is importantly identifiable in the material record. This hypothesis (also supported by Pauketat 1997, 1998) emphasizes the interrelationship between religion (e.g. the cosmos) and hierarchical rulership where ideology is used to legitimize authority. Further, such examples of ideological power are identifiable in mound construction, control over labor, the production of specialized material items, the identification of temples or other unique buildings, as well as in mortuary contexts (Emerson 1997; Pauketat 1994, 1997).

Additional hypotheses focus on the construction of Cahokia as an urban space, as well as having far-flung economic control emanating out of Cahokia to surrounding smaller communities (see Dalan et al. 2003; O'Brien 1989; Peregrine 1992). Still other perspectives identify complexity and hierarchical organization as manifested in size- how large Cahokia was (in terms of people, volumes of earth, number of mounds) in comparison to surrounding polities- as directly correlated to the power and control of elites over commoners and other communities (see Milner 1998; Muller 1997). Some scholars choose to refer to Cahokia as a state (as opposed to a chiefdom) where political power is differentiated based on hierarchical social organization and control over economic resources, systems of tribute, and peripheral farming communities (see Holt 2009; O'Brien 1991, 1992). And finally, archaeologists look to mortuary behavior as markers of complexity where individuals were identified as elite or powerful based on the context within which they were buried (see Brown 1971; Fowler et al. 1999; Goldstein 1980; Milner 1984; see Chapter 3).

All of these perspectives are concerned with markers of complexity, identifying elite goods, recognizing powerful individuals in mortuary contexts, locating evidence for control of goods and labor, as well as determining the degree of complexity (simple, complex, or paramount) by evaluating the buildings and monuments that make up the built environment as well as the hierarchical relation among multiple sites. Additionally, many of the archaeologists who focus on Cahokian complexity attempt to identify complexity as a tangible thing (much like the identification of religion as a thing) (see Alt 2010b). Such an approach is concerned with macroscale methods of analysis based in lists of traits that when identified and combined "produce a whole that is greater than its parts" (Alt 2010b: 122). This method relies on a systematic understanding of human practice and implies that complexity is additive and circular-to identify complexity there must be evidence of more than one particular type of trait and to have more than one type of trait their must be complexity. Elite buildings, elite burials, specialized locations, and prestige goods are offered up as markers of complexity that can be typologized and examined cross-culturally (see Smith ed. 2012). This perspective allows for an understanding of complexity as representative, thus ignoring the actions and relationships of what people actually did in the past. Complexity as a marker of hierarchically organized societies is no longer a particularly useful mode of analysis when attempting to unpack the dynamic actions of Native Cahokians. I instead choose to follow closely to Susan Alt's (2010b: 123) argument:

> Complexity is engendered through people's interactions with one another as well as their engagement with the material world. These interactions created interdependent relationships of meaning and action that change the whole and yet are inseparable from the whole.

So, as with religion, complexity theory should be thought of in terms of relationships where regardless of the organizational components of a society, archaeologists focus on the ways in "which people *lived* economies or *practiced* politics or *created* social networks" (Alt 2010b: 123, emphasis added). This is an archaeology less concerned with categorizing things and more concerned with the complexities born out of the relationships among things, places, and persons.

THE POINT

New Animism and the Complexity of Religion

In addressing Cahokia's beginnings throughout the remaining five chapters, I choose to explore how relationships were created and maintained through the particular *complexity of religion* as generative of culture change. By incorporating recent research in relational ontology and an understanding of animism (from a Native American perspective) with data on ridge-top mortuary mounds, the integration of these spaces into the built Cahokian landscape (which includes the East St. Louis and St. Louis precincts), and the orientation of these monuments in relation to the Rattlesnake Causeway, I address Cahokia's beginnings as bundled with religion (*sensu* Pauketat 2013a), rather than part and product of Cahokia's slow emergence as a hierarchically complex chiefdom. After presenting the myriad of ways anthropologists and archaeologists deconstructed and categorized animism, religion, and complexity, the reader might wonder why I am choosing to stick with those words- 'religion' and 'complexity'. I argue that thinking of religion as a complexity in and of itself attempts to break down the boundaries established by post-Enlightenment scholars. I am not interested in identifying religion as a monolithic and structuring thing, but rather I am interested in locating practices and experiences through an archaeology concerned with context and history. By focusing on mortuary spaces, practices and events I choose to look at one part of the complexity that is religion; that “provide[s] explanations for the deep desire to deny the finality of death” where religious beliefs and practices can be inextricably tied to everyday experience (Wentzel van Huyssteen 2010: 102; see Bloch and Parry 1982; Hertz 1960). Let us move now to relational ontologies and theories of New Animism to better understand how this might work.

Relational ontologies and theories of New Animism have recently been reintroduced into the archaeological study of Indigenous societies with a particular emphasis on the relationships created among human and other-than-human persons (Alberti and Bray 2009; Baltus and Baires 2012; Bird-David 1999; Harvey 2006a, 2006b; Herva 2009: Zedeño 2009). In particular, these theories “are concerned with how people in the past *related* with specific things, places, elements, and objects *as* other social beings in specific moments, and specifically the social consequences of those relationships” (Baltus and Baires 2012: 170, emphasis original). This approach invalidates the implicit dichotomization inherent in post-Enlightenment studies of the ‘primitive other’ and addresses complexity, not as a progression from one type of social group to another but rather as the confluence of practices, people, places, and materials (see Baltus and Baires 2013; Alberti and Bray 2009; Morrison 2000). These relationships, and their historical contexts, are important to understanding the emergence of societies because they consider the agency of persons as having the “ability to effect change or shape a social situation” (Baltus and Baires 2012: 170; see also Pauketat 2013a). These abilities oftentimes involve powers and persons beyond the human and “[u]nderstanding how that happens means pinpointing the occurrences where the ethereal is presenced on earth” (Pauketat 2013a: 27). Relational and animistic theories expand where post-Enlightenment theories of religion and complexity cannot, providing a space to explore the multidimensional connections among realms, places, people, histries and things as well as their ability to *effect change*.

I would like to revisit Irving Hallowell's (1960: 19) piece entitled *Ojibwa Ontology, Behavior and World View,* which opens with a quote from Paul Radin: "the Indian does not make the separation into personal as contrasted with impersonal...[and] seems to be interested in [the] question of existence, or reality; and everything that is perceived by the sense, thought of, felt and dreamt of, exists." Radin's insight orients Hallowell's chapter, which focuses on the concept of 'world view' or how a "man sees himself in relation to all else" (Hallowell 1960: 20). Hallowell argues, that such pre-conceived Western interpretations and definitions of social organization and relationships as limited to the actions of human persons become problematic when applied to a community or 'culture' where persons are more (or other) than human. Hallowell identifies a distinctly unique way of approaching non-Western religious beliefs and ways of being that do not separate and dichotomize practices, beliefs, people, and things; rather his approach (which, importantly, is the Ojibwa approach) considers the relationality of things "without any distinction between human persons and those of an other-than-human class" (Hallowell 1960: 22).

Important to this perspective is that things (persons) have the *potential* to manifest animate properties (not unlike our water worn rocks or human bones mentioned at the beginning of this chapter), not that all things are always animate, but that they can become animate under certain circumstances and experiences (Hallowell 1960: 25; see also Deloria 2003; Fowles 2013). This particular argument is critical to discussing religious beliefs and practices in the archaeological past, focusing on the important components of a 'world view' as not partitioning certain actions or places as separate from others, but rather considering the relationships created among people, places, and materials. This concept insists on understanding the *historical context*, the macroscale and microscale of experiences, focusing on the interrelationship of context, the agency of actors, and their "power to alter relationships and to shape history" (Pauketat 2013a: 27). New Animism and concepts of relationality emphasize the importance of place and temporality, where persons are constituted in relation to their surroundings (natural or constructed) (Harvey 2006b: 18; see also Deloria 2003). This relationship between the land and persons as an extension of one's worldview (or cosmology [*sensu* Echo-Hawk 2009]) has some import when thinking about Cahokia's beginnings; it is likely that the natural landscape out of which Cahokia was constructed had particular relational qualities that linked persons to place in ways that effected social and political change. Additionally, this natural landscape had its own history of human occupation that may have affected the ways early Cahokians approached the construction of their city.

In the context of the Cahokian mortuary landscape, which included at least 18 ridge-top monuments (see Fowler 1997; Pauketat 2010), such a presencing of relationships is discernable by identifying the locations of ridge-tops in relation to the diverse neighborhoods of Cahokians, the Rattlesnake Causeway, marshlands, as well as the hundreds of persons (including materials) buried inside the mounds. These relationships comprise entanglements and movements of things (Ingold 2008), which include objects and materials, persons, places, and practices. It is these relationships, or 'going's on' (Heideger 1996), that then comprise the complexity of religion, which is also identifiable in the archaeological record if we choose to look beyond the symbolic meanings of materials or dead bodies to consider the context within which they were used, lived, and buried.

Approaching archaeological contexts in such a manner allows for a more fluid understanding of the past, one that has potential to access meanings and experiences previously overlooked by scholars concerned with typologies and categories of analysis. Theories of complexity, then, are not limited to identifying the type of chiefdom or state that Cahokia was, but rather should encompass religion *as a complexity itself* considering the context and practices that occurred at/in/with ridge-top mortuary mounds as generative of cultural change. In addition, when incorporating a New Animism perspective into this complexity, relationships (and the movements that constitute those relationships) are foregrounded. It is this practicing and complexity of religion that informed the creation of Cahokia (see Janusek 2008, 2006; Smith 2003 for comparison studies). New burial practices manifested in the landscape in uniquely constructed mortuary mounds (that prior to Cahokia did not exist) containing not only bodies but marine shell beads, copper covered ear spools, projectile points, pottery, and items like mica and rolled sheet copper (see Ahler and DePuydt 1987; Fowler et al. 1999; Pauketat 2010; see also Chapters 4, 5 and 6). Such complexities of earth, people, and things were early constructions (ca. AD 150) 'bundled' with Cahokia's beginnings, and were in and of themselves *complex* (see Chapters 4, 5, 6) (see Pauketat 2013a).

Choosing to reconsider the impact and importance of religion as a complex 'meshwork' of elements (that in this context includes materials, persons, and monuments) (see Ingold 2008) requires a paradigm shift away from trait lists toward a wholly different way of thinking where "[p]olitical activity and religious activity are barely distinguishable. History is not divided into categories. It is simultaneously religious, political, social, and intellectual" (Deloria 2003: 194). Through this perspective I will provide a theory of Cahokia's beginnings that considers the relationality among ridge-top mortuary mounds, drastic modifications to the landscape, movement of persons and the burial of the dead as complex 'doings' (see Fowles 2013).

CHAPTER 4

CAHOKIA'S RIDGE-TOPS

"[T]he middle realm is the more primary arena of religious manifestation and empowerment in Plains religious topology."

-Lee Irwin (1994: 32)

In this chapter, I present an overview of the previously identified and excavated ridge-top mortuary mounds located at Cahokia, which includes the precincts of East St. Louis, St. Louis, Downtown Cahokia, and the Mitchell site, to understand the chronological and contextual relationship between ridge-top burial mounds and Cahokia's beginnings. First, through a consideration of location, construction, and orientation of ridge-top mortuary mounds, I investigate ridge-tops as key organizational components of Cahokia's site layout, aligning platform mounds, plazas and neighborhoods to a unique grid system. Second, by considering the historical context within which ridge-tops were constructed and used, I document the creation, maintenance, and reinterpretation of a particular religious knowledge 'bundled' in ridge-top mortuary mound practices that include the construction of special use buildings, the interment of things like marine shell beads and copper items, and the burial of multiple individuals (see Pauketat 2013a). The decision to construct ridge-tops in particular locations and in similar ways potentially speaks to a shared Cahokian religion, one that informed and literally built the Cahokia, East St. Louis and St. Louis precincts, and one that would have been "ongoing over the course of 10 Cahokian generations" (Pauketat 2010: 29). Additionally, I discuss the processes of preparing and burying multiple individuals in ridge-top mounds to understand the relational and historical implications of Cahokian mortuary practices as part of religion. The processing and burial of a body intimately connects a "material thing and a conceptual media...through which sense was made both of bodies and of the world" (Fowler 2008: 56).

The location, chronological affiliation, and historical context of ridge-top mounds will be presented, ending with a review of previous archaeological investigations and interpretations into these unique mounds. In addition, this background situates my recent excavation data and analysis of Rattlesnake ad Wilson Mounds (see Chapters 5 and 6) with what is already known about Cahokian ridge-tops. I am specifically concerned with the historical context of ridge-top mound construction and practice. Examining these mortuaries together and as part of a complex of practices and beliefs (as opposed to isolated occurrences) embedded within the Cahokian community should provide new insight into how Cahokian's built and experienced their city.

LOCATION, CHRONOLOGY, CONSTRUCTION

The Cahokia precinct consists of approximately 120 earthen mounds (Fowler 1997; Kelly 1994; Pauketat 2004, 2010). The East St. Louis and St. Louis Precincts total 80 additional mounds, bringing the compiled mound total across all three precincts to 200. Of these 200 mounds, Fowler (1997: 188) identifies 8 as definite ridge-tops while Dalan et al. (2003: 93-95) suggest the number is more like 10 (Table 4.1). Pauketat (2010: Table 2.1) argues for 17 total ridge-tops, which includes three from the East St. Louis, St. Louis, and Mitchell precincts. The discrepancies in numbers of ridge-tops identified at Cahokia stems from interpretations of data gathered during original surveys and early 19th and 20th century archaeological work (see Moorehead 1929; Titterington 1938). Most of the earthen mounds distributed across these four precincts were small enough to be borrowed away or plowed over leaving their identification to maps and old archaeological and survey records (see Fowler 1997: 188). Aerial photographs taken in 1922 provide images of some of these monuments, including Powell Mound, one of the largest ridge-tops constructed at Cahokia (Figure 4.1). Of these possible 17 original ridge-tops 2 are still intact in their original form (Rattlesnake Mound/Mound 66 and Red Mound/Mound 49);

the others were either borrowed away for fill (Powell Mound), were plowed down, impacted by construction (Mound 64), or were excavated and destroyed (Wilson Mound, Mound 72) (see Fowler 1997) (see Figure 2.2).

In addition to their unique shape, location, and size these mounds served as burial grounds for multiple individuals buried according to distinct mortuary programs, typically with sumptuary items like marine and fresh water shell beads, mica, copper, and non-local projectile points. Prior to AD 1050, Late Woodland populations in the American Bottom region buried their dead expediently, sometimes in oval pits, and sometimes in modest cemeteries (Bareis and Porter eds. 1984; Emerson et al. 2003; Fortier et al. 2000). In both the Lower and Central Illinois River Valleys (just north and north east of the American Bottom) Late Woodland period mortuary practices consisted of burials in loaf-shaped mounds or in cemeteries arranged by familial and kin based groups (see Goldstein 1980; Perino 1973). Although the concept of burying persons in mounds was not completely new to Cahokia (e.g. Hopewell burial mounds with log-lined crypts) (see Byers 2006; Carr 2006), what was new was 1) the scale and construction of ridge-top monuments and 2) the placement and orientation of these mounds at specific locations within Cahokia's currently know site boundaries.

Ridge-top mounds are unique to the Cahokia region and chronological sequence (with one possible exception, Mound C at the Shiloh site in Tennessee [Pauketat 2010]), characterized by their distinctive size and shape: large earthen mounds with a ridge-top similar to the hipped roofs of Mississippian houses (Pauketat 1994, 2010). Moorehead described them (1929:104) as "too narrow on top for large wigwams or temples" identifying their distinctive shape as impractical for elite residences or other specialized performative practices. Besides their elongated and ridged form, these mounds range in height from approximately 1 m (Mounds 2, 49) up to 13 m (Mounds 66, 86). This height variation roughly corresponds to the placement of the mound within the Cahokia site: larger mounds on the outer site limits and smaller mounds located more centrally within 1 km of Cahokia's center (marked by Monks Mound) (Dalan et al. 2003: 93-95; Fowler 1997: 188). Due to a lack of systematic excavations of the majority of these ridge-tops, detailed chronological affiliation is lacking for almost all of the identified monuments (see Table 4.1). For those that have been excavated, or at the very least documented during their destruction, at least 4 mounds (Mound 66, Mound 72, Wilson Mound and Mound 49) have construction phases that date to the Lohmann phase (AD 1050) and Cahokia's emergence. One additional mound (Powell Mound) dates to the Stirling phase placing ridge-top construction within the early half of the Cahokia sequence (Ad 1050-1100). Mound 72, Mound 49 and Mound 66 are importantly located in Cahokia's downtown area, and align along the trajectory of the Rattlesnake Causeway now known to mark the sites 5^{o} east of north axis (see Dalan et al. 2003; Romain 2012) (see Figure 2.5).

As discussed in Chapter 2, Harriet Smith (1969) first recognized the 5^{o} east of north alignment focusing on the orientation of mounds, plazas, and household complexes during two independent excavations (during the 1950s) at Murdock Mound and Monks Mound, respectively. Nelson Reed (1968, 1969) also documented this alignment, but likely after Smith first postulated her hypothesis. Smith posited that the orientation of Murdock Mound's base was positioned 5^{o} east of north and aligned with Monks Mound (1969: 70). Nelson Reed (1968, 1969, P.C. 2012) also identified this 5^{o} offset grid, recognizing the alignment as it was marked by the orientation of Monks Mound and what he thought at the time was a long, raised, straight ridge emanating from Rattlesnake Mound (the Causeway). Importantly, Reed noticed that this alignment was *repeated* in mounds, plazas and households (1969: 35).

In contrast, Melvin Fowler espoused a different alignment; one oriented to the cardinal directions. In this scenario, Monks Mound centered Cahokia's orientation, with four plazas marking each of the cardinal directions and a hypothetical 2.8 km long site line connecting Rattlesnake Mound on the south with Mound 72, Mound 49, the western edge of the first terrace of Monks Mound, and the Kunnemann Mound group to the north. Importantly, Fowler's cardinal orientation does not align with the recently corroborated orientation of the Rattlesnake Causeway, nor does it correctly link the upright marker posts located at Mound 72 and Monks Mound; as Dalan et al. (2003) point out these marker posts were not contemporaneous (see Fowler 1997).

Recently, William Romain (2012, *in press*; see also Pauketat et al. *in press*) identified the overall alignment of the Cahokia precinct to a lunar standstill (specifically a southern maximum moonrise), a celestial occurrence when the moon rises at its southern most extent once every 18.6 years. At Cahokia ca. AD 1050, when viewed from Rattlesnake Mound, the azimuth of this moonrise was 130^{o} and visible over the bluffs to the southeast. Romain (*in press*) suggests that by drawing a square, which uses the sight line from Rattlesnake Mound to the moonrise azimuth as the diagonal of that square, the resulting vertical axis will have an azimuth of 355^{o}, five degrees west of north; "[t]hat is, it is offset from north in exactly the opposite manner from Cahokia's observed axis" (Romain *in press*). According to Romain, this indicates that the causeway was a *mirror image* of this moonrise alignment and the "baseline for the central precinct's plan" tying the precinct's spatial layout in with a specific celestial happening observable over the bluff line to the southeast of Cahokia (Pauketat et al. *in press*; Romain 2012, *in press*). To note, this bluff line parallels the Mississippi River floodplain and separates Cahokia from the nearby uplands by a steep edged 150-foot relief, a relatively impressive natural boundary in a typically flat landscape (Grimley et al. 2007: 4).

Cahokia's alignment is flipped, a mirror image, and as Romain argues this corresponds to the ways Cahokians might have envisioned and experienced their world; it was all about perspective. When standing at certain points on the Cahokian landscape a person would have particular views of the mounds, plazas, neighborhoods, and cosmos orienting themselves within the broader context of the community. Romain, following others (see Pauketat and Emerson 1991 for example), suggests that the builders of Cahokia were so aware of not only mirror imagery, but also of celestial movements as related to one's position in either the sky or on the earth, that aligning a site to a flipped lunar standstill is not so far fetched (see also Pauketat 2013a).

Most importantly, this notion of mirror imaging is related to how some Native American persons (and communities) conceived of the Land of the Dead as a *reverse* of the living world (see Romain *in press*; see also Irwin 1994; Lankford 2007). Considering this, then, it does not seem so out of the ordinary that Cahokia's site line and organization were constructed to mirror a lunar standstill creating a liminal space on land that at once tied together the underworld, the upper world and the lived-in-world, much like a Ramey pottery vessel (see Pauketat and Emerson 1991) (Figure 4.2). Specifically, Pauketat and Emerson (1991: 932) argue, "[t]he pot, however, is a three-dimensional object. The most visible component of this object, the inslanted rim/design field, would have presented the viewer or user with a potent symbolic reminder of the order of the cosmos." If Cahokians incorporated this perspective into their pottery it is also likely that they built this same perspective into their landscape, identifiable on both the macro and micro-scales in mounds, in-filled pits, construction fills, and site alignments. The notion of a tri-partite division of the world is not a new concept, but the notion that the physical causeway is aligned to the mirror image of a lunar standstill and the upper world, but also to the realm of the dead and the living *is* new, diminishing any conceived boundaries between these three realms. These 'tri-partite' boundaries become subsumed by the movement of both human and other-than-human-persons negotiating relationships with the earthen causeway and ridge-top mounds. Such negotiations became physical ways to access all of these intimately connected realms.

Using the Rattlesnake Causeway, 752 m long by 25 m wide, which emanates from the center of Rattlesnake Mound, passes east of Mound 72 and culminates south of the Twin Mounds, Romain argues that the overall order and alignment of Cahokia was not only tied to a lunar standstill but was also constructed in specific reference to Rattlesnake Mound (Mound 66); this orientation and site layout would have required immense planning, forethought and organization to identify the 5 degree offset, to construct two massive earthworks (the causeway and Mound 66) to mark this alignment, and to build a large city in reference to a lunar standstill (Pauketat et al. *in press*) (Figure 4.3). Additionally, the majority of Downtown Cahokia (which includes the causeway) was constructed ca. AD 1050 (which corresponds to the date of the maximum south moonrise Romain references); this period also saw a huge influx of people- around 10-16,000- and a substantial reorganization of local courtyard groups into rigidly aligned Cahokian neighborhoods (Pauketat et al. *in press*; see Collins 1997; and Mehrer and Collins 1995; see Chapter 2). If Romain's alignment to a lunar standstill is in fact supported by the archaeological evidence, then Cahokia's beginnings consisted of new and complex relationships based in a unique ridge-top mortuary program, lunar movements and alignments that likely informed a 'New World Order', literally rearranging people and things personifying the cosmos, presencing the dead, and uniting the living world with that of the lower and upper worlds (see Pauketat 2013a).

In addition to this lunar standstill, I do want to comment on the importance of the horizon line in site organization as it was used to watch and monitor the movement of the sun, an equally important celestial body (see Benchley 2000; Fowler 1997; Wittry 1969). Briefly, Warren Wittry (1969, 1996) and Melvin Folwer (1996) argued that Cahokia's Woodhenge was constructed to observe the summer and winter solstices as the rising and setting of the sun, marked by the Woodhenge posts, cited the horizon line and the terraces of Monks Mound. Fowler (1996) further argued that these alignments were part of the organizational pattern of Cahokia, marked by the un-corroborated Mound 72 Woodhenge and the Woodhenge located west of Monks Mound.

Equally important to the alignments marked by Woodhenge, are the locations of ridge-top monuments and their intentional placement both along the Rattlesnake Causeway and on the edges of the Cahokia precinct. The largest ridge-top mortuaries (between 9 and 13 meters in height), Rattlesnake and Powell Mounds, were constructed along the southern and western limits of the Cahokia precinct between 1 and 2 km away from Monks Mound respectively, hypothetically demarcating Cahokia's precinct boundaries. Dalan et al. (2003: 95) hypothesize that the Powell Mound complex (dating to the Stirling phase AD 1100-1200), located near Cahokia Creek on the western side of the Cahokia precinct, potentially signified or marked one's arrival into Cahokia, at least from the main corridor of the Mississippi River and Cahokia Creek. On the east, a small possible ridge-top, Mound 2 (date unknown), marked one's entrance from Canteen Creek (Dalan et al. 2003; Fowler 1997) and due south, Rattlesnake Mound (dating to the Lohmann phase AD 1050-1100), situated in a low-lying marshy swale flanked on the east by a ridge, identified the likely southern extent of the precinct.

Fowler (1997: 188) further hypothesized that these monuments were oriented to the cardinal directions noting, "half of the mounds identified as ridge-tops are oriented northwest-southeast or southwest-northeast." Fowler (1997: 188-189) also indicated that Mounds 2 and 85 appear on maps as mirroring each other: Mound 2 located on the eastern precinct edge is oriented northwest southeast while Mound 85, at the western site limit is oriented southwest northeast. Both of these mounds sit on the banks of the Cahokia Creek potentially marking those hypothetical precinct boundaries, or entryways, bordered by water on either side. The orientation of these ridge-tops (Mounds 2 and 85) contrasts with what Fowler argued was a mainly north-south and east-west orientation of the remaining platform mounds, plazas and households, further emphasizing the distinction between ridge-tops and other monuments at Cahokia (Fowler 1997: 188). Fowler (1997: 189) uses these "uncommon" orientations to support his argument that ridge-top mounds were indeed marker mounds, delineating city limits; however, he also indicates that these orientations are approximations and that not all of the ridge-tops follow this pattern.

Instead, I would emphasize that at least Powell Mound, Mound 65, Mound 64, Rattlesnake Mound, and Red Mound are aligned in relation to the 5^{o} offset grid, which also corresponds to the trajectory of the Rattlesnake Causeway (see Figure 2.5). When engaging with these mounds on the macro-scale and as foundational parts of the Cahokian landscape, instead of viewing these monuments as 'marker mounds' or otherwise inanimate street signs situated on the precinct boundaries, ridge-tops become *directly associated with the emergence of Cahokia* and a shift in community organization ca. AD 1050 (Cahokia's "Big Bang") (Emerson 1997; Fowler 1997; Pauketat 1994). Based on the locations of these monuments and their chronological affiliation, the construction of ridge-tops, along with the Rattlesnake Causeway, set up Cahokia's city plan, one that was not simply aligned to the cardinal directions but based in a pervasive mortuary program and religion embodied by and in each ridge-top mound as it was tied to the cosmos.

As previously stated, construction began on four ridge-tops ca. AD 1050: Rattlesnake Mound, Mound 72, Wilson Mound and Red Mound, three of which are known to contain human remains and sumptuary items (Rattlesnake Mound, Wilson Mound & Mound 72). Construction on Powell Mound began during the late Lohmann/Stirling phase and also contained human remains and sumptuary items. Kelly (2004) hypothesizes that the Great Mound (Mitchell site) dates to the late Stirling-early Moorehead phase, basing this temporal affiliation on early accounts of the site and artifacts recovered from salvage excavations. The attribution of the Great Mound to the late Stirling/early Moorehead phase, however, needs further confirmation with ceramics found in fill rather than potentially intrusive burial features; Kelly (2004) identifies the presence of early Lohmann phase pottery as well as marine shell beads made in the same manner as those present at Mound 72, Powell Mound, and Wilson Mound. Kelly (2004) also records the presence of a Cahokia cordmarked vessel (typically dates to the Moorehead phase) associated with a set of human remains identified after the excavation of the ridge-top mound. It is unclear if these burials pre-date the mound or if they are late additions, in the same vein as those burials interred after the completion of Mound 72 (see below). Regardless, the temporal affiliation of the Great Mound is unclear and, based on comparative and contextual evidence I am inclined to suggest that this mound may have been contemporaneous with Powell Mound (Stirling Phase). The East St. Louis Cemetery Mound, like Powell, is also attributed to the Stirling phase suggesting that at least four mounds were constructed early and at least two more ridge-tops were constructed in the middle of Cahokia's history (see Pauketat 2010).

It is important to note that ridge-top mounds changed form throughout their use usually beginning as a platform mound (as in the case of Mound 49 and Wilson Mound) or a series of smaller core mounds (Mound 72, Powell Mound). Ridge-top mounds were constructed according to a standardized method, beginning with a foundational burial, building, pit, and/or post pit, followed by the construction of a small core platform mound and additional series of structures, pits, mortuary features and mound layers. These construction sequences were ultimately covered over by subsequent mound construction episodes and fills to form the final ridge-top mound shape (see Fowler 1997; Fowler et al. 1999; see also Ahler and DePuydt 1987).

Mound 72, for example, consisted of a series of three primary mounds and associated mortuary features capped with a gumbo-clay cap to form the final ridge-top mound shape (Fowler 1997: 188; see also Fowler et al. 1999). This change of shape, however, did not necessarily reflect a change in function. Based on the results from a series of excavations across ridge-tops, and especially Mound 72, it is apparent that Cahokian mound builders had a plan for these mortuary spaces employing a standardized method of construction along with a programmatic series of foundational buildings and unique burials (see Fowler et al. 1999). These foundational platform mounds might have housed temples, or other special-use structures, that were subsequently covered over with an earthen roof enclosing and decommissioning the building in preparation for the next episode of construction.

Construction methods identified at excavated ridge-top mortuary mounds consist of layers of colored and prepared soils as documented in profile photographs and maps compiled during original excavations (see Ahler and DePuydt 1987; Holder notes on file UMMA; Moorehead 1929; Pauketat et al. 2010). Recently, Sherwood and Kidder (2011: 74) examined mound construction methods from three Mississippian mound contexts and compiled a standardized typology of construction fills and techniques "in mound building providing specific engineering properties that create a stable earthen structure able to withstand the humid environment of the Southeastern and Midwestern US, and capable of supporting at least one large wattle and daub structure". The categories of construction fills include the following: sod blocks, soil blocks, fills (e.g. basket loading), zoned fills, and prepared veneers (Sherwood and Kidder 2011).

Sod blocks consist of intact sections of surface soils held together "by dense rootlets from the source area and usually include a portion or all of the surface A horizon and the natural transition to the underlying B" (Sherwood and Kidder 2011: 74-75). Sod blocks can be used to create buttresses or embankments; for example Bareis (1975: 10) describes such structures used to construct retaining walls on the south side of the third terrace of Monks Mound. Bareis argues that the strategic placement of sod blocks would allow a flat-topped mound to remain stable and withstand compression over time (see also Sherwood and Kidder 2011). Sherwood and Kidder (2011: 75) additionally cite the initial construction episodes at Shiloh Mound A (in Tennessee) as consisting of inverted sod blocks, which likely allowed the "grass to grip the steep slope…the increased surface area of the absorbent granular structure would have provided effective erosion control."

Soil blocks differ from sod blocks in that these structures do not contain the "surface material or A horizon" present on sod blocks and instead are comprised of intact clay-rich B horizon removed from their original context "in mass" (Sherwood and Kidder 2011: 76). Recent research suggests that soil blocks were used to construct initial core mounds, as these clay-rich soil blocks would provide stable surfaces to withstand compression over time (Sherwood and Kidder 2011; Sherwood 2007; see also Schilling 2010). Mississippian mound builders, however, may not have made such a distinction between soil and sod blocks, as soil blocks would be the next accessible layer borrowed from the same area as the aforementioned sod blocks.

Basket-loading, a technique that includes visible single dumping events amassed to construct one major fill event, results in an overall irregular appearance due to the method of construction that involves filling a vessel (e.g. a basket) with soils and dumping them on top of one another to create one massive loaded fill zone (Sherwood and Kidder 2011; see also Van Nest et al 2001). At Monks Mound this method of construction was identified as multiple loads of individually prepared, colored and textured soils layered on top of one another (see Schillling 2010; Sherwood and Kidder 2011; Pauketat et al. 2002). Additionally, these basket-loading events "homogenized and loaded (i.e. mantles) often appear as extensive mound building episodes later in the building process and are used to cover a previous stage surface to raise the height of the mound" (Sherwood and Kidder 2011: 78).

Zoned fills contain the juxtaposition of light and dark layers, previously identified as 'blanket mantles' "placed horizontally alternating from permeable to less permeable layers and back, to improve moisture balance and create horizontal zones" strengthening mound slopes (Sherwood and Kidder 2011: 78; Pauketat 1993, 2000, 2004, 2008). The selection of colored and textured soils, however, also had a social aspect creating a color combination of dark organically rich clays and lighter sandier soils, which Pauketat (2013a: 179) suggests "were Witnesses or portals between the people of this world and the beings and ancestral spirits of another." This color combination of light and darks soils is not isolated to mound construction, and has been identified in the lining of pit features, the floors of special use buildings, and the in-filling of house basins (see Otten et al. 2007).

In addition to zoned fills, prepared veneers consist of thin layers of "different source material that have been applied to an external slope or stepped surface" (Sherwood and Kidder 2011: 80). Veneers usually range in size from 2 to 15 cm in thickness composed of alternating soils that present a "stark color contrast" when viewed in profile (Sherwood and Kidder 2011: 80). Veneers should be differentiated from intact floors or living surfaces "in that they [veneers] are on slopes and not directly associated with the remains of buildings" (Sherwood and Kidder 2011: 79). Veneers likely served both functional and symbolic roles (like the zoned fills discussed above), providing stable surface barriers preventing the absorption of rainwaters and also providing a distinctive contrast in color visible in the series of mound construction episodes (Sherwood and Kidder 2011: 82).

Recent studies on the rate of mound construction at Mississippian and Archaic mound sites in the Midwest and Southeast suggest that some earthen mounds were built rapidly- likely over weeks and months rather than years. This is supported by data from Poverty Point Mounds A and B (Archaic period mounds in Louisiana), and Shiloh Mound A (Mississippian period mound in Tennessee) (see Sherwood and Kidder 2011; Kidder 2004; Schilling 2010). Sherwood and Kidder (2011: 91) hypothesize that the pace of mound construction was dictated by the overall mound function; mounds that did not support a building were likely built in one single event, while others that did support structures were built in stages, which served as a platform for a structure or as a surface for other mound activities (e.g. burials, emplacement of marker posts). This is evidenced by the presence of soil erosion, soil formation, or anthropogenic use (e.g. the construction of a building) on intact surfaces of the earthen mound.

In comparison, rapidly constructed earthen mounds (like Poverty Point Mound A) were built using a combination of the above methods and fills lining slopes with sod blocks and veneers to ensure stability (Sherwood and Kidder 2011). The lack of soil erosion, soil formation, and/or level surfaces between construction fills supports the hypothesis that certain mounds were built quickly and with a large labor force; Kidder (2010) suggests a time frame of 90 days for Poverty Point's Mound A.

The varying methods of Mississippian mound construction are important when thinking through what is known about building sequences of ridge-top burial mounds. For example, Rattlesnake Mound was built using basket loads, zoned fills, and soil blocks (single dumping events amassed to construct one fill event) collected and prepared in batches of light and dark fills. Mound 49, the small ridge-top centrally located in Cahokia's Grand Plaza, was constructed in a series of thin mantle layers, sandy wash lenses, and light and dark packed sediments (Pauketat et al. 2010). Following this series of construction fills, Mound 49 was enlarged with the final layers (constructed during the Stirling through Moorehead phases) "having at least one documented surmounting building" associated with hearths and red ochre (Pauketat et al.

2010).

Similar construction layers have also been noted in platform mounds like Kunnemann Mound (Pauketat 1993) and Mound 31 (Sullivan and Pauketat 2007). For example, Mound 31 consists of nine different layers with construction beginning during the Lohmann phase followed by "[e]ight relatively thin levels [that] were added probably by A.D. 1150" (Sullivan and Pauketat 2007: 27). Mound E 11 at the East St. Louis site (southside excavations) "betrays clear evidence of discrete fill zones and likely sequential construction stages" (Pauketat 2005: 123). Similarly, excavations into Monks Mound also revealed colored layering of sediments laid down in stages (see Reed 2009: Figure 18). These stages consisted of alternating light and dark bands of fills, zoned fills, thick mantle deposits of soils, and basket loads of prepared fills (see Sherwood and Kidder 2011: 78). Importantly the distinctive construction of ridge-top mounds, built up in a series of episodes of sub mounds, specially colored soils, elaborate burials and features, exemplifies shared construction methods that include a series of well planned, quickly executed stages particular to mortuary ridge-top mounds (see Pauketat 1993, 2004; Reed et al. 1968; Smith 1969).

Overall, mound construction techniques provide a view into the geotechnical knowledge required to build earthen mounds and indicate that construction was planned and organized, likely by individuals with a particular set of skills and expertise (Sherwood and Kidder 2011). The question then becomes, what drove people to come together and participate in such labor-intensive projects? At Cahokia, there is no evidence for conscripted or slave laborers, there is also no direct evidence that the act of building earthen mounds was directly regulated or controlled by 'chiefs' or hierarchical leaders. Drawing on recent hypotheses (namely by Sherwood and Kidder 2011), I would argue that mound construction was an organized and participatory event lead by persons who shared a privileged knowledge and set of skills. These knowledges, however, are not unique and had the potential to be passed down from the Archaic period where we have some of the first evidence of monumental mound building (e.g. Poverty Point). The source of a builder's knowledge was likely based in a broader Cahokian ontology, one with roots in Poverty Point, Hopewell, and Effigy Mound societies. The difference amongst these mound-builder societies manifests at Cahokia in the overall site organization and plan and the possible underlying desire to construct a city intimately entangled with religious 'doings', the cosmos and the dead via newly introduced ridge-top mounds (see Fowles 2013).

PREVIOUS INVESTIGATIONS of RIDGE-TOP MORTUARY MOUNDS at CAHOKIA, EAST ST. LOUIS, ST. LOUIS, and MITCHELL

Details of ridge-top mound construction and uses are limited to data gained during the destruction and/or excavation of Rattlesnake Mound, Powell Mound, Wilson Mound, Mound 49, Mound 72, Big Mound, Cemetery Mound and Mitchell Mound located in the Cahokia precincts of Downtown Cahokia, East St. Louis, St. Louis, and the Mitchell Mound Center (located 11 km north of Downtown Cahokia along Long Lake [Kelly 2004]) (see Figure 2.2). The following summaries and analyses draw from original publications and unpublished notes for each of these ridge-top mounds in order to compile and centralize all of the known information on Cahokian Mississippian ridge-top mortuary mounds. Rattlesnake Mound and Wilson Mound are presented in Chapters 5 and 6, respectively.

Powell Mound

Powell Mound (Mound 86) was located on the western boundary of the Cahokia site and noted by P.F. Titterington, W.K. Moorehead, J.R.R. Patrick and Thorne Deuel as Cahokia's second largest mound, exceeded only in size by Monks Mound (Ahler and DePuydt 1987) (see Figures 2.2, 4.1). Today, a large store front and parking lot occupies the area where the Powell Mound group once stood, at the junction of Illinois State Highway 11 and US Route 40 about 2.6

km west of Monks Mound near Cahokia Creek (Ahler and DePuydt 1987: 1). Powell Mound was first recorded by J.R.R. Patrick on his original 1827 Cahokia map, but was not numbered at that time. Moorehead's (1929: 84) early description of Powell Mound focused on its size and placement as one of the largest rectangular mounds at Cahokia with a ridge-top shape, stating that Powell was so "regular in outline [that it] stands out so clearly as an artificial structure that it should by all means be preserved". Moorehead identified the east west orientation of the mound (like Rattlesnake Mound) noting its size as 310 feet east west, 170 feet north south with a height of 40 feet. Other observers (Titterington 1938; Patrick 1876) recorded similar findings for length, width and height estimating that Powell Mound sat at about 90 m x 50 m and 13 m in height. The relative stasis of these measurements suggests that Powell Mound was not directly impacted by farming or any other methods of destruction that regularly affected other mounds at the Cahokia precinct; its shape and size were very well preserved up until its destruction in the 1930s (see Fowler 1997).

During the late 1920s, the Powell brothers (who owned the mound) offered $3,000 to any scientific institution to conduct archaeological excavations into the mound as long as they deposited the fill into the surrounding low lying areas on their land. No institution accepted the offer and in December 1930 the Powell brothers decided to level the mound by steam shovel (see Figure 4.1) (Ahler and DePuydt 1987). A substantial portion of the mound was razed before anyone knew of its destruction, mainly because the Powell brothers began removal of the mound on the side that could not be seen from US Route 40. In late December 1930, A.R. Kelly of the University of Illinois was sent to observe and record the destruction. The Powell brothers granted Kelly permission to conduct hand excavations if they did not interfere with the contractors (Ahler and DePuydt 1987; see also Titterington 1938). P.F. Titterington, an amateur archaeologist from St. Louis, was also on hand during the razing of the mound. The materials collected during this salvage work were curated with the Illinois State Museum.

The collection of archaeological data began about 16 days after the destruction of Powell Mound began and did not include the construction and use of the upper most portion of the mound. Although tragic, the steam shovel used to destroy and remove Powell Mound provided opportunities to view cross sections through both the major (east west) and minor (north south) axes. These cross sections (see Ahler and DePuydt 1987: Figure 5) revealed at least two massive episodes or stages of construction: a lower platform mound followed by the addition of the ridge-top cap (similar to Wilson Mound, see Chapter 6) (Figure 4.4). This lower platform is visible in cross section as a clearly demarcated dark line delineating the lower construction sequence from the upper (Ahler and DePuydt 1987: Figure 2). The accumulation of this dark layer (approximately 10 cm thick) suggests that the lower construction stage was stable for a sufficient length of time, long enough to permit a soil horizon to accumulate through human occupation and use (Ahler and DePuydt 1987: 3). Based on original notes and photographs the lower mound portion was built using a black gumbo clay (like Rattlesnake Mound), which makes up a large part of the topsoil present in the American Bottom and was easily accessible for construction (Ahler and DePuydt 1987: 3; Fowler 1997). Above this foundational platform mound of gumbo clay, the final mound stage was mainly composed of lighter soils and sediments sandier than the previously used gumbo clays. This final construction episode gave the mound its ridge-top shape essentially capping the lower platform mound and completing its use.

Prior to the addition of the ridge-top cap, on a stable surface at the interface between these two layers, Ahler and DePuydt (1987:4) describe two large rectangular burial pits (again like Wilson Mound, see Chapter 6); based on the description by Titterington (1938) both features were likely structure basins underlying the later deposits of human remains. One such burial feature, located approximately one-third of the way into the mound from its western edge, contained "many small fragments of bone, some of which appear to have been burned, and thousands of small shell beads [likely *Marginella* sp.]" identified in linear rows. Additionally, Titterington noted that this entire burial complex was located within a rectangular pit "10 paces long". The second feature was located on this same platform surface one-third of the way into the mound from its eastern edge; this feature was partially excavated by University of Illinois observers and identified as a rectangular pit measuring 6.1 m x 9.1 m, very similar in size to the rectangular 'pit' that housed over 150 burials (buried in 31 bundles) located at the base of ridge-top Rattlesnake Mound (Ahler and DePuydt 1987: 4) (see Chapter 5).

Both Titterington and Kelly (notes on file University of Illinois) described the burial located in the eastern pit as composed of parallel cedar sticks laid flat across the pit bottom, followed by a layer of bark; the human burials were placed in bundles on top of the bark layer and covered over with "one to five layers of small shell beads" (Ahler and DePuydt 1987: 4) (Figure 4.5). These shell beads (*Marginella* sp.) were found in parallel rows over the bones likely composing a shell blanket or mat (like the one present at Mound 72 and similarly at Wilson Mound). Another layer of bark was placed on top of the shell beads along with shell necklaces, and copper covered cedar wood ear spools (Titterington 1938; see also Ahler and DePuydt 1987). Also present on the surface of the first major mound stage was a large upright cedar post; upon excavation the post measured at least 46 cm in length. Together, the two burial pits and large post pit formed a straight line oriented slightly north of due west, very similar to the final orientation of the mound after the ridge-top cap was emplaced (Fowler 1996).

Titterington and Kelly completed the salvage work in January 1931 when the razing of the mound was halted. In February 1931 Thorne Deuel, of the University of Chicago (in coordination with the Milwaukee Public Museum), obtained permission to conduct controlled excavations into the remaining 2.1 m of the basal portion of the mound (Ahler and DePuydt 1987: 5). Duel placed two trenches through the major (east west) and minor (north south) mound axes. Ahler and DePuydt (1987: 6-7) reconstructed the profile of the major (east west) trench cut from original excavation notes. Based on these notes the primary construction of this ridge-top consisted of a series of small core mounds later consolidated into the primary platform mound identified by Titterington and Kelly in their earlier excavations. This type of construction was also seen at Mound 72, where three sub mounds were built over the top of burial features before the final ridge-top cap was emplaced. At least 5 different mound construction sequences were described by Deuel: three separate core mounds constitute one construction sequence, followed by two intermediate stages, the primary platform mound, and the final ridge-top mound cap (Ahler and DePuydt 1987: 7).

Deuel's excavations also revealed a pre-mound occupation with ceramic materials dating to the Lohmann and early Stirling phase (AD 1050-1100). Ahler and DePuydt (1987: 23) argue that this pre-mound component was likely a small village site occupied during the emergence and expansion of Cahokia (ca. AD 1050). The subsequent mound construction phases, they argue, date to AD 1100-1200 indicating a dynamic change in land use during that span of 100 years, which was "in concert with the general evolution of the Cahokia site" (Ahler and DePuydt 1987: 23). Repurposing a village site for the construction of the largest ridge-top mound in the Cahokia precinct indicates an intensive implementation of an overall site plan key to Cahokia's early existence as a community (see Dalan et al. 2003; Fowler 1997).

In the late 1960s, the remaining Powell Mound area was impacted again by the construction of a large discount store and parking lot. A University of Illinois field school (led by Charles Bareis) excavated into the base of the decimated Powell Mound, in the remnants of smaller surrounding mounds, and nearby areas (Fowler 1997: 158). The data from these excavations has not been published but is briefly summarized by Ahler and DePuydt (1987) and Fowler (1997). Charles Bareis argues “two or three feet of the mound base remains north of the Venture Store and parking lot…perhaps the northern one third or…one half of the bottom two feet of the mound is still there” (Fowler 1987: 160).

Artifacts

Artifacts from both Deuel and Titterington’s excavations are currently housed at the Illinois State Museum (a majority of the human remains and shell beads were never transferred to the ISM and were not available for discussion here) and were previously analyzed by Ahler and DePuydt (1987: 10-34). The following is a short summary of these materials; for a more thorough discussion please see Ahler and DePuydt (1987).

Ahler and DePuydt (1987) conducted a thorough pottery analysis of the materials housed at the ISM. This analysis ascertained a chronology of mound construction and determined the temporal association of both the pre-mound occupation and the mound itself dating to A.D. 1050-1200. Shell-tempered ceramics predominate the assemblage and the ‘Emergent Mississippian’, Stirling and Moorehead phases are most widely represented. In total 3,288 body sherds were collected, and of those 2,714 are shell tempered (see Ahler and DePuydt 1987: Table 3). Similarly shell tempered ceramics dominate the rim sherd assemblage with 280 (out of 336) rims shell tempered. One hundred and seventy of those shell-tempered sherds were jars, and 90 of those shell-tempered sherds were jars with a plain exterior and red slipped interior. Seventy-six rims represent shell-tempered bowls, and the remaining rims consisted of plates, one saltpan, water bottle, and beaker (Ahler and DePuydt 1987: Table 4, 5). The majority of the rims from the pre-mound component (n= 11) date to the early Lohmann phase (Ahler and DePuydt 1987: Table 6). Twenty-two rims from mound matrix proveniences date to the Lohmann-Stirling phases while 16 date from the late Stirling-late Moorehead phases

(Ahler and DePuydt 1987: Table 8). Ultimately both the body and rim sherds indicate that the mound, and pre-mound area, were occupied and utilized continuously up until at least the early Moorehead phase.

The lithic materials from these excavations, Ahler and DePuydt argue, represent the production sequence for microdrills (1987: 24-26). Four hundred and ninety four chipped stone artifacts were found in Powell Mound, with the majority (266) collected from a fill zone in a slough located directly west of the mound. Ninety eight percent of the chipped stone materials were made from locally derived Burlington chert. A total of 44 microdrills were identified in the pre-mound occupation, slough fill, and two pit features associated with the mound. The remaining chipped stone materials consist of shatter and flake debitage, cores (amorphous and microdrill), prismatic spall, and bifaces (see Ahler and DePuydt 1987: Table 9). The majority of the lithic materials are associated with the pre-mound pit features, and slough fill areas; these proveniences also house the majority (n= 314) of the artifacts associated with microdrill production.

Microdrills were typically used in the production of perforated shell beads; however, the lack of shell beads present in the mound context (with the exception of the beads layered with the burial) indicates that these microdrills were used in the production of shell beads likely transferred elsewhere (Ahler and DePuydt 1987: 27). The microdrill deposit is associated with pre-mound activities and do not denote any specialized deposit related to the burial of multiple individuals. They do indicate that a specialized practice (shell bead manufacture) occurred in this area prior to the construction of the mound, which may have informed the choice to transform this village into the location for Powell Mound. Additionally, 59 groundstone artifacts were recovered from the same contexts, the majority (n= 34) consisting of sandstone abraders utilized in the production of shell beads to round the bead edge and produce the final product

(Ahler and DePuydt 1987: Table 9).

A total of 275 shell beads were found in the mound matrix and consist of 233 *Marginella* sp., 15 *Busycon* sp. disk beads, and 27 *Ancolusa* sp. fragments. The *Marginella* sp. shell beads are proximally ground and found in the "salvaged group burial on the summit of the main pyramidal mound construction stage" (Ahler and DePuydt 1987: 30-31).

Human Remains

This section concerns the human remains recovered from the general context of Powell Mound 86 and the eastern burial platform, accounting for a total of 22 discrete individuals (skeletons [SK's]) (notes on file ISAS, see also Bukowski et al. 2011) (see Tables 4.2, 3). Minimum number of individuals (MNI) was calculated based on duplicate elements, the age or developmental stage of the elements, visual matching based on morphology, pathology, and taphonomy, and provenience information (Bukowski et al. 2011). The MNI of 22 individuals includes 1 infant (0-1 y.o.), 1 child (4-5 y.o.), 2 sub adults (12-16 y.o.), 7 adults (>20 y.o.), 1 adult (>35 y.o.), 1 adult (25-35 y.o.), 4 adults (20-30 y.o.), 3 middle adults (30-35 y.o.), and 2 adults (30-50 y.o.); of which three are females, 4 are males, and 14 are individuals of unknown. Of the 22 individuals 8 were identified as buried in the burial platform (see Table 4.3). Pathologies were limited to dental disease (linear enamel hypoplasias, abscess) and active/healed bone remodeling due to periostitis (bone infection) on 7 of the present long bone elements. Additional pathologies were noted on cranial fragments and consist of bone remodeling and endocranial lesions due to infection (Bukowski et al. 2011, report on file ISAS). This sample of remains is not complete and represents only a small portion of the individuals buried in the eastern burial platform and in the mound itself. No cut marks were identified on any of the remains, although the remains (from the burial platform) were bundled and disarticulated at the time of burial.

Six AMS radiocarbon dates, run on bone collagen samples initially purified and used for stable isotope analysis were taken from human remains excavated from two Powell Mound contexts: the burial platform and the general mound context date the burial platform to a calibrated date between AD 1062-1155. The remaining samples from general mound contexts provided dates ranging between calibrated AD 1154-1256 (see Bukowski et al. 2011).

Mound 49

Mound 49, or Red Mound, is located approximately 150 meters south of Monks Mound and 150 meters east of Mound 48, in the northwest center portion of Downtown Cahokia's Grand Plaza (Pauketat et al. 2010) (see Figure 2.5). Its name, Red Mound, is attributed to the placement of an old park sign and it's association with red-slipped pottery identified during farming of the mound (Fowler 1997: 114). Red Mound was first identified on the Patrick map as conical in shape; the 1966 University of Wisconsin map documented Red Mound as elongated and oval with an east-west axis of 50 m, a width of 35 m (north to south) and a height of 1.7 m (Fowler 1997: 114; Pauketat et al. 2010: 397). These measurements and overall shape encouraged Fowler to suggest that Mound 49 was indeed a ridge-top burial mound, not unlike Mound 72. As previously mentioned Fowler also incorporated this mound into his overall site alignment highlighting its relationship to Monks Mound and Mound 72 (Fowler 1997; Pauketat et al. 2010). Although Mound 49 was never extensively excavated (like Powell Mound or Wilson Mound) erosion and farming degraded the height of the original mound summit.

As part of their larger 1989 Grand Plaza archaeological research project, Dalan and Holley investigated the relationship between the Grand Plaza and Mound 49 using non-invasive techniques, limited coring, and test-excavation (Dalan 1993; Holley et al. 1993). In total Dalan and Holley put in five test blocks in the area of the Grand Plaza between Mound 49 and Mound

56 (see Holley et al. 1993: Figure 2). Test Block 1 caught the southwestern edge of Mound 49 and documented the lower mound construction methods indicating that the builders of the plaza employed a lateral borrowing technique, which was also used to construct the initial layers of Mound 49. Cores were collected from the center of the mound and the northeastern slope. Bone was recovered from the first core; a pottery sherd and a piece of shell were collected from the second core. The identification of shell and limestone tempered pottery suggest an early Mississippian chronological affiliation (Holley et al. 1993; see also Pauketat et al. 2010). Overall, limited data were gathered from this initial testing of the mound.

In 1994, as part of the Early Cahokia Project (University of Oklahoma), Timothy Pauketat conducted excavations into Mound 49 to "better delineate the scale and configuration of those political and economic changes connected to the mid-eleventh-century redesign of Cahokia" (Pauketat et al. 2010: 397). The excavations determined that Mound 49 construction was "coterminous with the leveling of the Grand Plaza" supporting the hypothesis that Cahokia was re-designed around the mid-eleventh-century, and that this re-design included the construction of ridge-top mounds (Pauketat et al. 2010: 397; see also Dalan 1997). Pauketat and crew placed two 5 m x 2 m units into the lower north and south sides of the mound where they were sure to encounter "both the mound-plaza interface and any re-deposited refuse" (Pauketat et al. 2010: 401). Three days into the excavation these units were converted into two 5 m x 1 m trenches (Unit A and Unit B) and initially encountered a 30 cm deep plow zone covering an identified series of re-deposited fill zones suggestive of erosional processes that degraded the mound. Mound construction phases were encountered at a depth of 127.22 m asl and consist of mantles, and architectural features (wall trenches, post molds, hearths and a possible pit disturbance). The following short summaries are taken from Pauketat et al. (2010); for a more detailed discussion please see their article.

Unit A

Unit A, northern unit, was located at S 127-132, E 100-102 and dug to a depth of 126.73 m asl (1.82 m below the surface). The first episode of mound construction consisted of a very dark grayish brown sandy loam with brown mottles, followed by a series of thin mantles varying in thickness from 2-10 cm. Pauketat et al. (2010) hypothesize that this consisted of one construction event superimposed by a water laid deposit of grayish brown sandy loam with brown and gray silty clay mottles (see Pauketat et al. 2010 for soil color descriptions). The next phase of mound construction consisted of thick water-deposited silts and sands with a thin band of fine charcoal flecks and red ochre, which Pauketat et al. argue, was "indicative of a ritual burning event involving the use of pigment" (2010: 406). Following this episode, a series of at least 7 flat layers of silty clay, which alternate in color from dark brown fill to a light brown fill were deposited using a method of packed earth construction. This core mound was then substantially modified: the north face of Mound 49 was removed and remodeled probably during the Lohmann/early Stirling phase. Additionally, Pauketat et al. (2010) identified two stable mound summits with 1) a single-set-post wall structure (128.45 m asl), and 2) a wall trench structure, hearth and post mold (128.52 m asl).

Unit B

Unit B, southern unit, was located at S 149-154, E 100-102, and was dug to a depth of 127.43 m asl (1.15 m below the surface). This series of construction episodes differed greatly from Unit A and consisted of a 4 cm thick foundational lens of laminated sand, followed by a single, thick (1.35 m) layer of very dark sandy loam with gray mottles, small flecks of burned clay and charcoal. This episode culminated at 128.55 m asl in a flat-topped summit surmounted by a wall trench, hearth, small pit, three post molds, and sandy wash lenses; small flecks of red ochre were identified sprinkled around these features. One additional wall trench was identified at an elevation of 128.72 m asl, followed by the final construction episode in Unit B: a dark grayish brown sandy loam layer varying in thickness from 25 cm to < 1 cm (Pauketat et al. 2010).

A total of 2,390 pottery sherds were recovered from Units A and B, the bulk of which were grit and grog tempered fragments likely of pre-Mississippian (Terminal Late Woodland) origin accidentally included within the mound construction fills. Thirteen Lohmann, Stirling and Moorehead phase jars were directly associated with mound activities. "This provides a minimum age- the Late Stirling phase or early Mooerehead phase- for the later mound fills and mound-summit activities…"(Pauketat et al. 2010: 411).

Similar to the pottery sherds, the lithic materials identified in fills were likely accidental inclusions. A total of 1,248 items were recovered: 45% chert flakes (mostly Burlington chert, 2 Cobden, and 3 Mill Creek), and 46% pebbles, sandstone, limestone and igneous or metamorphic rock. Pauketat et al. (2010) argue that the remaining items (20 pieces of hematite/red ochre, 1 galena cube, 3 sandstone abraders, two microdrills, and one chipped-stone arrow point) were likely *not* accidental inclusions but from similar contexts as the Stirling and early Moorehead phase jar rims.

Various organic materials from tertiary contexts were also recovered including 148 faunal bone fragments with 53% of the fauna burned. Charred plant materials and 3,956 pieces of burned clay were identified in the plow zone and mound fill horizons (suggestive of the presence of hearths/other burned features). Two isolated human teeth (incisor and premolar enamel) were recovered from the plow zone.

Overall, construction on this mound began in the early Lohmann phase and continued into the late Stirling and Moorehead phases. Repeated enlargements with at least one associated building characterized the last episodes of mound construction (Stirling through Moorehead phases). Hearths and red ochre particles were associated with two buildings.

Although its final shape suggests a ridge-top, this construction was not examined during these excavations; Pauketat et al. (2010: 418) suggest "[t]he shape would certainly suggest a final ridge-top configuration…such mortuary activity might have taken place atop a penultimate surface…[with] the last mound fill atop these floors…one massive ridge-top cap".

Mound 72

Mound 72 is by far the most extensively excavated and discussed Cahokian ridge-top mound located in the Cahokia precinct (see for examples Brown 2003, 2010; Fowler et al. 1999; Goldstein 2000; Pauketat 2010; Porubcan 2000). Its unique features, complexes of human remains, at least one large marker post, and local and non-local artifacts best demonstrates the pervasive and participatory nature of burial practices at Cahokia (see Fowler et al. 1999). In the late 1960s and early 1970s Melvin L. Fowler excavated Mound 72 with support from the National Science Foundation, the University of Wisconsin-Milwaukee, and the Illinois Department of Conservation (Fowler et al. 1999: 3). In this section I present a synopsis of the Mound 72 excavations with a special consideration of the mound construction sequences and chronological affiliation. Although much scholarship has already been devoted to the analysis of Mound 72, this review serves to situate the other two previously discussed ridge-tops within the broader social and physical mortuary landscape of Downtown Cahokia using this most extensively excavated mound as a point of reference and comparison.

Mound 72 is located 860 m south of Cahokia's Monks Mound, and aligns with Rattlesnake Mound and Red Mound along Cahokia's central 5^{o} offset grid marked by the Rattlesnake Causeway (see Figure 2.5). Fowler (1999: 3) states, "It [Mound 72] is unique in that the ridged top of the final mound stage is oriented on an azimuth of 120 degrees if viewed from the northwest to the southeast, or at about the angle of the winter solstice sunrise" and if viewed from the southeast, the azimuth would be at the angle of the summer solstice sunset.

Mound 72 culminated in a rectangular outline with a ridge-top shape measuring 45 m from northwest to southeast and nearly 15 m from northeast to southwest (Figure 4.6). Mound 72 was built in a series of three sub-mounds with construction beginning in the Early Lohmann phase (AD 1050) and the final ridge-top cap constructed in the Early Stirling Phase (AD 1100) (Fowler et al 1999: 60). Multiple sub-mound features and burials were constructed, used, and decommissioned prior to the initial construction of the mound itself.

Fowler et al. (1999), in *The Mound 72 Area: Dedicated and Sacred Space in Early Cahokia,* extensively review and explain these stages of construction; this is the main reference for my re-presentation of the data below. I break down the Mound 72 series beginning with pre-mound events, followed by a discussion of the three sub mounds and their associated burials and materials. For an extensive discussion of Mound 72 please refer to Fowler et al. (1999). Refer to figure 4.6 for a plan view of key Mound 72 features discussed below.

Pre-Mound Features

Prior to the construction of Mound 72, evidence for a large upright marker post, a small wall-trench building (Feature 225), and a series of refuse/midden pits were identified. Fowler and his team uncovered no evidence for a pre-mound habitation (e.g. no village site materials, no households, no storage pits). Feature 1 (post pit 1) was identified as part of Fowler's hypothetical Woodhenge monument and as a marker post sited to what Fowler argued was Cahokia's centerline and north/south axis. Located in the southeastern portion of the mound (underneath 72Sub1) this post was set 3 m deep, with two post impressions and three insertion and extraction ramps. Upon the decommissioning of this post, the pit was filled in a series of three stages: 1) naturally deposited materials, 2) washed in soils, and 3) mottled, dark mound fill. Two pieces of carbonized wood were found at the base of the pit along with two depressions from the likely re-setting of the post itself. Fowler argues, based on the stratigraphy of the insertion and extraction ramps, that the original post was set prior to the construction of the mound and that the last two post settings were contemporaneous with subsequent mound construction stages. Importantly, this post pit "was an integral feature of the mound's architecture" likely setting up the orientation for the later stages of Mound 72 construction (Fowler 1999: 46).

Feature 205, constructed directly on top of post pit 2, was a small rectangular pit (4 m x 2.5 m) with a sunken basin and prepared floor. The prepared floor consisted of light-colored sand (2-3 cm thick), followed by two layers of human remains "covered over with a fill similar to that described for the sediments below the pit floor" (Fowler et al. 1999: 46). This entire area (post pit 2 and burial pit) was covered over sometime later by 72Sub2 (Fowler does not indicate a date for the rectangular burial pit, but an associated midden dates to AD 1015) (Fowler et al. 1999: 44).

A wall trench structure (feature 225) built in the northwest sector of Mound 72 in a shallow pit (~20 cm deep) 6.8 m x 3 m in size, was oriented at an azimuth of 105^{o} (northwest to southeast) (Fowler et al. 1999:48). The east wall of this structure, facing post pit 2 (feature 204), was likely closed off by a screen instead of a solid wall and "[t]he intimate relationship of Features 225 and 204 may provide an explanation for the open end of the pit in which the structure was built"; these two features were contemporaneous (Fowler et al. 1999: 48). Interiorly, multiple post pits were located on the eastern side of the building suggesting the construction and use of a small platform, possibly used to place the deceased or to serve as a shelf. Few artifacts were identified in the structure fill or on the floor of the building leading Fowler and his team to interpret this building as a charnel house. At a later date (this feature was contemporaneous with post pit 2 and feature 206 [Fowler 1999: 48]) feature 225 was decommissioned and dismantled, a low earthen platform was built over the area and burials were interred directly over the building walls (Fowler et al. 1999: 48).

The Sub Mounds

As previously stated, Fowler argues, implicitly, that the construction and use of a Woodhenge circle pre-dated the series of 'elite' and 'sacrificial' burials, caches of artifacts, and non-domestic features present in Mound 72 (1999: 167). This hypothetical Woodhenge was the earliest construction (early Lohmann phase/AD 1050) in the Mound 72 sequence and was only dismantled when the final sub mounds (1,2,3) and ridge-top cap were completed. Importantly, for his analysis, Fowler identified that this possible Woodhenge marked the summer solstice sunrise signifying that Mound 72 was constructed with a particular reference to the cosmos and celestial movements. This hypothesis, however, is only supported by the presence of one monumental post; no other marker posts have been identified in this area leading to the alternate conclusion that a Woodhenge circle did not predate the construction of Mound 72. As discussed previously (see Chapter 2), other scholars (see Dalan et al. 2003; see also Pauketat 2013a; Romain *in press*) do not support Fowler's initial hypothesis that the Mound 72 Woodhenge post pits (only one of which was actually documented and identified) set up the Cahokia grid and instead argue that the Cahokia grid was oriented to the five degree offset as marked and oriented by the Rattlesnake Causeway.

Following the construction of at least one, corroborated monumental marker post, a series of human interments were placed near post pit 1- interpreted as dedicated to the summer solstice sunrise (feature 1/post pit 1/72Sub1) (Fowler 1999: 167). These burials were deposited in a series of three contemporaneous groups (101, 102, and 103) and "relate to a single cycle of activity at this location" (Fowler et al. 1999: 167). This burial series (both primary and secondary), Fowler notes, were placed 4.5 m west of post pit 1 and consists of feature 101 with approximately 17 individuals featuring two primary burials. Fowler et al. (1999: 64) describe these primary burials as two probable male individuals buried one underneath (prone) and one on top (supine) of a shell beaded blanket; recently, Kristin Hedman (P.C. 2013) of the Illinois State Archaeological Survey determined that this feature is more complex than previously assessed and consists, instead, of at least five individuals in direct association with the beaded blanket, one of which is a female (not a male as previously identified) buried underneath the beaded blanket.

A series of cached items were buried four meters to the southwest of the beaded burial in association with seven extended individuals present in feature 102. Projectile points made from both local and non-local cherts, copper roles, mica, shell beads, and discoidals were all present in this assemblage of artifacts (see Fowler et al. 1999: 168-169 for a detailed review). North of the beaded burial and feature 102, feature 103 consisted of an adult individual buried in the extended position and isolated from nearby burials. Sometime later, feature 104 (3 bundle burials) was intrusively excavated into feature 102 prior to the completion of 72Sub1. After the completed deposition of the human remains and associated burial items the area was covered over by the low platform mound 72Sub1, which incorporated the re-set post pit 1. After the foundational construction of 72Sub1 and associated burials, the mound was re-shaped and a platform (or alter) was placed on the western slope of 72Sub1. Dates for 72Sub1 are early (Lohmann Phase) and based on carbonized wood found in the base of post pit 1 (feature 1).

Approximately coeval with 72Sub1 were the activities that took place prior to the construction of 72Sub2 (the charnel house mound): the building, use, and decommissioning of F 225 (wall-trench structure), a complex sequence of burials and associated offerings, and a small platform mound that covered the entire 72Sub2 complex (Fowler et al. 1999: 173). The series of features associated with 72Sub2, were contemporaneous with the burials interred prior to the construction of 72Sub1 and date to the early Lohmann phase (Fowler et al. 1999: 175). The first event, on this end of the mound, was the construction of feature 225, which was dismantled and covered with a low platform built to display the remains of a series of 13 people buried in 3 pile burials (or bundles) (disarticulated and laid out on top of the location of the wall-trench building walls). Sometime later, three rectangular pits with human remains were placed in the area near the wall trench building; these three pits (features 205, 237, 214) are best described as mass burials consisting mainly of females (Fowler et al. 1999: 175). Details regarding sex and age are limited, and the assessment of "mainly female" determined by Fowler et al. (1999) is a subjective one. Following these mass interments, the area was covered over by 72Sub2 at approximately the same time as 72Sub1. 72Sub2's final shape consisted of a two-tiered platform mound roughly oriented toward the cardinal directions (Fowler et al. 1999: 176).

Prior to the completion of 72Sub3 (the last in the series of sub mounds) approximately two burial pits were dug into the southwestern slope of 72Sub2 and into the southeastern slope of 72Sub1. These pits were mass interments of individuals with linings of grass matting, two layers of burials, and a fabric covering. The aboriginal excavators of feature 236 dug directly into 72Sub2 after construction was complete and "knew the exact location of Feature 237 [previous burial pit covered over by 72Sub2] stop[ing] their excavation directly above the level of skeletal remains" (Fowler et al. 1999: 176-177).

These two intrusive pits on either side of the Mound 72 submounds were followed by a series of unique burials placed in the center between 72Sub1 and 72Sub2. These included a burial of four headless and handless men covered over by a small conical mound of banded light and dark sediments, and a rectangular pit located 2 m to the southeast of the four headless and handless men, containing the remains of over 50 young women (lined and covered with grass matting). This complex was then covered over by an additional mound measuring 20 m in length by 10 m in width joining 72Sub1 and 72Sub2 with 72Sub3. This was the last addition prior to the construction of the ridge-top cap.

Fowler argues that the completed sub mounds intentionally aligned to his hypothesized Woodhenge 72 and "must have been sacred space dedicated to the world views of the Cahokians and the leaders of the burgeoning community" (1999: 177). The final ridge-top shape was aligned to an azimuth of 120^{o} (or 30^{o} south of east)- the azimuth of the winter solstice sunrise. Prior to the final construction of the ridge-top cap, however, one final burial (feature 229) was added to the southwestern face of 72Sub3. This burial pit was distinctly different than the aforementioned others, lined with white sand and contained the remains of 39 sacrificial individuals. In one instance a person was still alive when deposited into the pit (with fingers digging into the pit side walls in an attempt to get out), in another a persons skull was completely dislodged from his/her appendicular skeleton and tossed into the opposite side of the pit. These characteristics and the sprawled orientation of the bodies (described as 'with arms and legs "akimbo"') supports the conclusion that this pit was sacrificial in nature (Fowler et al. 1999).

No discernable pattern or preference for male or female individuals or age was identified among these sacrificial remains and Cahokian's sealed this final pit with a layer of matting and 15 litter burials (tightly bound bodies buried on cedar pole litters) placed directly on top of the sacrificed dead. The litter burials, likely prepared and preserved elsewhere, were brought here for final burial and the closure of Mound 72 mortuary activities. Before the final capping of the mound the monumental marker post associated with 72Sub1 was pulled dating the end of the Mound 72 events to AD 1100-1150 between 50-100 years after the first mound activities (Fowler et al. 1999: 181). During the Stirling and Late Stirling phases intrusive primary and secondary burials were buried into the southern face of Mound 72 suggesting that this area remained a sacred location even after the completion of mound construction.

The Artifacts

The Mound 72 ceramic assemblage, according to Vander Leest (in Fowler et al. 1999: 85), is “the least spectacular and, consequently, the least significant” of all the artifact assemblages present in Mound 72. The majority of the ceramics present in this assemblage date to the Lohmann phase. In total 2,211 pottery sherds were recovered and analyzed; an additional 7,500 sherds from nine cached and crushed *in situ* vessels were also recovered. The highest concentrations of pottery came from the midden features (F 227, 206). Two hundred and nineteen rim sherds represent a minimum of 110 vessels and the majority of the rim sherds (60%) were recovered from two midden features (F227, 206). Nine whole vessels were found in two contexts: six located in feature 236 (cache pit) and three found with the ‘retainer burials’ associated with the burials of feature 219 and 101.

Three characteristics are common amongst this ceramic assemblage: 1) shell tempering (65% of the assemblage), 2) red exterior slipping (37.6%), and 3) a plain, buff-colored interior surface. Decorative sherds make up 1% of the sample and include design features like punctates, negative painting, incising, and engraving. One stumpware vessel and three foreign vessels were also present in the assemblage. Overall, Vander Leest suggests that the Mound 72 assemblage indicates a solid Lohmann phase temporal affiliation and shows a bias towards Mississippian-tradition ceramic styles (Fowler et al. 1999: 97). Additionally she argues that the pottery assemblage was not based in generic household debris; the Mound 72 ceramics were specialized along with the activities that took place in the mound (Vander Leest in Fowler et al. 1999: 97).

Three separate caches of chipped-stone projectile points were recovered during the course of Mound 72 excavations. The points found in these cache contexts were of general high quality chert and manufacture “and are believed to be indicative of a high status position when associated with burials" (Ahler in Fowler et al. 1999: 101). Two caches (1550, 1551) were uncovered as part of the 72Sub1 complex in the southeast portion of the mound. Cache 1550 was found scattered around the legs of burial 10 and consisted of 332 points deposited in small groupings. Cache 1551 consisted of 413 points arranged in small groupings around the skull of burial 6. The third cache, 1970, was located at the opposite end of the mound from the first two caches. It consisted of 451 items found as a single pile of points (see Ahler in Fowler et al. 1999: 103-104). Importantly, caches 1550 and 1551 were both deposited in direct association with two burials and as part of a larger mortuary group (7 burials) in the southeastern part of the main mound (associated with the beaded blanket burial). Additionally, a copper "staff", shell beads, chunkey stones, and "a large pile of uncut mica" were directly associated with this complex of individuals and materials (Ahler in Fowler et al. 1999: 104). Cache 1970, on the other hand, was deposited as part of the contents of a large rectangular cache pit (F 236) associated with primary mound 72Sub2. This pit was excavated into the same location as the burial pit (F 237) located just south of the decommissioned and covered over charnel house that housed the foundational Mound 72 burials (Fowler et al. 1999: 105). Ahler argues that the activities corresponding to the excavation and filling of this cache pit were the last set of activities carried out in the northwest section of the mound, likely facilitating its closure and movement toward the construction of 72Sub1 and 72Sub3 (Fowler et al. 1999: 105).

Ahler identified 11 point types overall, each of which had multiple variations (see Fowler et al. 1999: Table 8.1, Figure 8.4). Common point types recovered include the Cahokia tri-notched, Agee, and the Madison types. The remainder of the categories consists of non-local points (e.g. Oklahoma and the Ozark region) and variations on the common Cahokia styles. Caches 1550 and 1551 both contain a wide variety of point styles made from local and non-local cherts; cache 1970 had less variation in point style and all made from local cherts. Forms common to the 1970 cache include the tri-notched triangular point and the unnotched ovate point, both of which are common to Cahokian assemblages (Fowler et al. 1999: 113). Based on these differences and similarities Ahler (Fowler et al. 1999: 113) argues:

> that the 1550 and 1551 caches served the same social function--grave offerings associated with high-status burials in the southeast primary mound. The 1970 cache is quite different, especially regarding context, and I propose that this cache served a different social function.

Although Ahler's conclusions are overly simplistic, the basic notion that these three caches served different functions is relevant to understanding the burial practices at Mound 72. Important is his identification that the 1551 and 1550 caches contain objects made from non-local materials; this suggests that these items were made in different locales by different peoples called to participate in the activities at Mound 72 (see Fowler et al. 1999; see also Pauketat 2010).

The lithic production debitage recovered from Mound 72 does not contain any assemblages related to the production of projectile points. Instead the debitage indicates the production of "unifacial industries and the manufacture of large bifaces, resulting in…artifact classes that are similar to lithic assemblages from Mississippian domestic households"(Fowler et al. 1999: 117). Ahler (Fowler et al. 1999: 119-120) determined that the lithic tools and debitage represent five major lithic industries: 1) microdrills, 2) large bifaces, 3) small bifaces, 4) core-flake industry, and 5) ground stone. Overall, the majority of the chert items included in the Mound 72 context were made from high-grade Burlington chert (97.5%). The majority of the artifacts collected were recovered from two distinct phases of mound construction: the central midden located south and southeast of 72Sub2, and the later re-orientation of the mound and addition of the large burial pits located on the southwestern mound flank. Early construction stages (including the building of the northwest and southeast primary mounds and high-status primary burials) contained little lithic debris, yet when the mound construction activities are reoriented away from the Mound 72 submounds, the amount of lithic debris doubles (Fowler et al. 1999: 126). Ahler argues that this discrepancy in the amount of lithic artifacts indicates an intentional 'purification' of the mound fill used to construct the core submounds (Fowler et al. 1999: 126-127).

Additional artifacts include chunkey stones, shell beads, rolled sheet copper, and uncut mica. In total 15 chunkey stones recovered from two caches. Briefly, chunkey was a popular game played among the Native Americans of eastern North America. One played the game in teams by rolling the round chunkey stone down a smoothed square area of land (e.g. a plaza). Points were given if one's spear hit the stone or landed closest to the stone when it stopped rolling; additional points were awarded for preventing another player to hit the stone (see Fowler et al. 1999: 129; see also Hunter 1973: 185). Eight of the chunkey stones buried in Mound 72 show evidence of wear, were biconcave, and likely decommissioned from the chunkey game (Fowler et al. 1999: 131).

At least 60,000 shell beads were present in various contexts in Mound 72, which can be broken down into 7 types found in three contexts (caches, burials, and middens). The shell material present in feature 227 (midden) consists of mussel-shell fragments and several natural shell beads not found anywhere else in the mound. The beads present in the burials consist of small and large disk beads, and the beads in the caches (236 and 102) consist of a wide variety of types that included disk beads, columellae beads, and small 'natural' shell beads (Fowler et al. 1999: 32). The midden feature 227 "was littered with scraps of mussel shell" (Fowler et al. 1999: 132). Most of the recovered shell remains were fragmentary but three intact mussel valves were found (two show sings of use, and the third was an agricultural hoe). Interestingly, only one whole whelk shell was identified in the overall mound assemblage. Eight burials (13, 14, 16, 69, 117, 119, 120, 123) contained shell beads in the form of disk beads strung in chokers or necklaces, hairpieces, and blankets, a mussel shell hoe, and a large conch/whelk shell pendent. Burials 13 and 14 ("Beaded Burial") were interred on top of and underneath a blanket of 20,000 shell beads consisting of both small and large disk beads. Several of the large disk beads were irregularly shaped due to the presence of part of the whelk whorl left intact on the side. When compared to the recent analysis of the shell beads from Wilson Mound (see Chapter 6) and the shell bead assemblage from Kunnemann Mound (Pauketat 1993) it is likely that the irregularly shaped disk beads were unfinished; not ground down to the final circular and smooth shape. The remaining burials all contained beads of different types typically strung as chokers/necklaces, pendants, and hairpieces (see Fowler et al. 1999: 135-136). For details on measurements and percentages of types please see Fowler et al. (1999: 135-136).

Shell beads were also present in abundance in two cache pits (F 236 and an unnumbered pit underneath 72Sub1) and included a large pile of shell beads in the northern part of F 236 (located in the primary mound on top of F 237), which measured approximately 100 cm x 45 cm consisting of 177 beads of the following types: large and small barrel beads, small and long parallel-sided beads, seed beads, and *Marginella* sp. shell beads. Additionally, 9 small marine shell pendants were present along with a very large conch shell (representing raw bead material). The second burial cache (underneath 72Sub1) located on a prepared surface included three strings of very large shell beads, chunkey stones, rolled sheet copper, mica, and the aforementioned caches of projectile points (1550, 1551). Fowler estimates the amount of beads to be at least 2-3,000 deposited in three strings (Fowler et al. 1999: 137).

In addition to the shell beads at least two tubes of hammered and shaped copper (weighing 624 grams and approximately 1 m in length) possibly filled with cedar wood were located underneath 72Sub1 (Fowler et al. 1999: 137). Next to this rolled copper 'staff' was a pile of unworked mica (85 cm x 60 cm). One red pipestone ear spool was found with burial 127.

Overall, the artifacts making up this vast and diverse Mound 72 assemblage indicate a variety of practices and events occurring throughout the construction and use of this mound. Based on the aforementioned data, the majority of artifacts indicate specialized or unique practices specific to burial 'ritual' and events. The non-specialized pottery and lithic assemblages were interestingly not included in the mound construction phases and features. Instead, these items were isolated to midden areas and areas located just off of the mound itself. The cached vessels, projectile points, shell beads, chunkey stones, and other unique items (ear spools, etc.) were all present in burial contexts or isolated as caches within the mounds construction sequence. This indicates that the events that took place at Mound 72 were likely planned and organized; people/participants did not come to the mound to make materials but rather to deposit materials along with their dead. The importance of the events at Mound 72 cannot be understated—this was one of the earliest constructions of its kind (quickly followed by Rattlesnake Mound, Mound 49, and Powell Mound and contemporaneous with Wilson Mound).

Cemetery Mound (E-1)

Cemetery Mound (E-1) was located in the heart of the East St. Louis precinct of Cahokia with its long axis oriented northwest to southeast flanked to the southwest by two small mounds E-2 and E-3. In December of 1870 this mound was destroyed, uncovering a series of features and burials potentially dating to the Stirling phase. Also at this time a *Daily Democrat* reporter documented the mound's size and shape as "40 feet in height, oval in shape, and about 300 feet long" (12 m high, 91.4 m in length) comparable in size to the Big Mound at St. Louis, Powell Mound, and Rattlesnake Mound (Kelly 2004: 20, see also Kelly 1994). The details of the Cemetery Mound destruction are limited to an article composed by an anonymous reporter for the *Daily Democrat* (Kelly 1994: 20):

> …bone was found in two vaults- one a square structure, the other a crescent form, and both about fifty feet across. [No measurements were taken, and distances are only estimated.] One of these vaults was near the southern side of the mound, the other about the center, and they were more than thirty feet below the original apex of the mound. The crescent vault was covered over with a roof formed of thin slabs of limestone rock, of different sizes, and showing no marks of tools. The roof had been supported on wooden columns, and the sides lined with wood; but all the woodwork had decayed, and the roof had fallen in, disarranging the bones, so they appeared in confused heaps. In the vaults where these bones were found were many relics of the race who first occupied the ground- entire jug-shaped vessels of unglazed earthenware, stone hammers, hatchets and chisels; oblong beads perforated in the center lengthwise, marine shells, arrowheads, vases, pieces of flint, etc. Many of these relics had bee carried off by the workmen and by visitors…Not the least interesting of the objects brought to light were the eight cedar posts…two of these posts were on exhibition at a saloon near by…they appear to have been...placed in the ground at a distance of sixteen feet apart, and they stood under the center of the mound…charcoal was found in many places in the mound.

Two shell-tempered sherds were recovered from this context along with "numerous marine-shell beads […], a marine-shell-cup fragment, a group of woodworking tools […], a chert spud […], and a copper-covered ear spool" (Kelly 1994: 24). Kelly (1994) attributes the two pottery sherds to at least the Stirling phase (shell-tempered and burnished exteriors). The marine shell beads included drilled, whelk columella beads, a disk bead, and a drilled *Olivella sp*. bead. The portion of a whelk shell cup was also included in this assemblage.

An additional newspaper article from the *St. Louis Republican* reported on the destruction providing a slightly different account of the mortuary feature. This report suggests "that the skeletal remains in the square pit were smaller in stature than those in the semicircular pit [and] were probably females" (Kelly 1994: 24). The reporter describes the pit as:

> found the remains of about one dozen beings, a hard piece of stone formed the shape of a chisel, also, a peculiar little stone, which when held between the eye and the rays of the sun, has the appearance of being interspersed with small particles of gold…The second vault was built nearly square…and was also filled with bones and some few pieces of peculiarly [sic] shaped pottery [Anonymous 1870a: 3] (Kelly 1994: 24).

Although both reports lack details and accurate locations of features, two things immediately stand out 1) the presence of two mortuary buildings/features that contained the disarticulated and bundled remains of multiple individuals, and 2) the inclusion of shell beads, woodworking tools, and copper covered earspools in the same contexts as the human remains. From these initial reports and Kelly's (1994) reanalysis of the curated materials (and a later write-up by John Francis Snyder [1909]), Cemetery Mound appears to have been built in at least two stages, similar to the construction sequence described for Powell Mound, and contained at least one core platform mound which served as the stable surface upon which the two mortuary buildings were constructed. This was followed by the addition of the final ridge-top cap elongating the mound and orienting it to a northwest southeast line. The human remains from the two mortuary features are described as "a mass of mingled human bones" of multiple bundled interments like those buried in Wilson Mound, Powell Mound, and Rattlesnake Mound. A concrete chronological affiliation could not be ascertained for this mound, but based on the minimally recovered artifacts (shell-tempered pottery, marine shell beads, and overall similarity in mound construction, size, and contents) it was likely constructed during the Stirling phase and contemporaneous with Powell Mound, The Big Mound, and Mitchell Mound (Kelly 1994).

The Big Mound

The Big Mound, one of 27 mounds in the St. Louis precinct, was located in what is now downtown St. Louis, MO across the Mississippi River from the East St. Louis and Cahokia precincts (Williams and Goggin 1956). Big Mound was described as 319 feet (97.2 m) in length and 158 feet (48.2 m) in width with "a long, slightly round-topped…on a north-south axis with a lower terrace on the east side" 34 feet (10.4 m) in height (Williams and Goggin 1956: 12). The Big Mound's orientation was not cardinal as reported, but slightly east of cardinal and more inline with the Cahokia precinct five degree offset alignment (see Kelly 2004: Figure 1.2). In 1869 the Big Mound was destroyed and the fill was purchased by the North Missouri Railroad to construct the railroad roadbed that ran through St. Louis (Marshall 1992). Like Cemetery Mound, Powell Mound, and Wilson Mound, Big Mound was constructed in at least two major stages: a primary core mound and an upper ridge-top cap (based on photographic evidence, see Marshall 1992: Figure 14).

According to accounts summarized by Marshall (1992) and Williams and Goggin (1956) at least one burial containing two skeletons was located on the northern flank of the core platform mound. This pair of burials (referred to as “the big Indian”) contained a set of copper covered Long Nosed God masks recovered from behind the ears of one of the primary burials. Masks such as these are recorded from only seven sites throughout the Midwest and Southeast and include items made of copper and marine shell; additionally the Big Boy flint clay figurine (now known to have been made at Cahokia) recovered from Craig Mound at the Mississippian site of Spiro was depicted wearing such masks (Williams and Goggin 1956; Emerson et al. 2003).

A central burial pit was also documented during the destruction of The Big Mound and contained between twenty to thirty individuals buried together in a north to south oriented structure built on the original ground surface prior to the addition of the ridge-top mound. Williams and Goggin (195: 21) describe this feature as, “a roofed vault with slightly contracting sides whose floor was on about the level of the old ground surface. If this was a true burial chamber…it could be compared to the one at Spiro…[n]o vestiges of a wooden roof were found, however, and the possibility that what he [Conant] observed was merely a large burial pit…must be considered.” Also noted, was that this burial contained a series of strands of marine shell disk beads covering the bodies as they lay in an area “some seventy feet in length, and between twelve and twenty feet wide” (Williams and Goggin 1956: 21).

Although the information gained from these accounts is very limited in scope, we at least know that the mound was constructed in a minimum of two stages (an early platform and a final ridge-top cap), with a foundational building and burial pit containing at least 20 individuals, a series of marine shell disk beads, and a later burial of two adult males(?) interred with an assortment of items (pottery, marine shell columna and disk beads) including a pair of copper covered Long Nosed God masks. The chronology of the mound is not known in any detail, but based on the presence of the marine shell beads and the similarities shared with the other known ridge-top mounds from the area the later burial, at least, is likely attributable to the Stirling phase (see Williams and Goggin 1956; see also Marshall 1992).

The Mitchell Mound/Great Mound

The Mitchell Mound/Great Mound was located in the Mitchell Mound center 11 km north of Cahokia along Long Lake, in a group of mounds described as the northern precinct of the Cahokia complex (see Pauketat 2005; Kelly 2004). This mound group consisted of eleven mounds mostly destroyed in 1876 when construction for a railroad commenced; the fill from the mounds was subsequently used to fill in low-lying areas in preparation for the railroad bed (Kelly 2004). Henry Howland's 1877 account of the destruction and Porter's excavations in the 1960s, conducted as part of the Interstate 270 archaeology project, revealed the presence of "a short lived community dating to the late Stirling and early Moorehead phases, ca. AD 1175-1250" (Kelly 2004: 269). Porter's excavations uncovered the site organization, which included 10 mounds organized around a central plaza with a large bald cypress log post emplaced in the center. A palisade wall may have encircled this central complex, and to the west of this group at least one other mound, and possibly three, included the large mortuary ridge-top: The Great Mound.

Howland's (1877) original description of The Great Mound includes an estimated diameter of 120 feet (36.5 m) and a height of 27 feet (8.2 m). McAdams (1882), another surveyor and local amateur archaeologist described the mound after a portion was already borrowed away for railroad fill identifying an interior platform mound (like Powell, Cemetery, The Big Mound, and Wilson) and an overall dimension of 300 feet (91.4 m) at its base, 25 feet (7.6 m) high composed of "black dirt". McAdams (1882: no page number, as cited by Kelly 2004: 274) also conducted his own limited excavations into the base of the mound identifying "human bones in three places, apparently about the edge or foot of the mound…buried with these bones in many other places in the mound are many remains of sea shells." Importantly, Howland (1877) also noted a six by eight foot wide area of bone, eight inches thick that extended west to east across the mound approximately four to five feet above the mound base. Howland proposed the possibility that the individuals buried in this context were bundled together in a long trench for burial. Kelly (2004: 279), citing a local St. Louis newspaper, suggests that this low platform and burial area was quickly covered over by a light colored clay, enclosing the burial and beginning the construction of the ridge-top cap.

In addition to this burial area, another pit feature (6 feet by 8 feet) contained a "concentration of unique artifacts, much of which had been wrapped in matting and many of which were copper or copper-covered" (Kelly 2004: 279). These materials included "[t]ortoise shells formed of copper", a lower deer jaw with copper covering the teeth, three copper-covered bone earspools, a copper-covered wooden 'staff', copper-covered wood pendants, a Ramey knife, a bundle of eight copper rods or needles wrapped in matting, bone awls and needles, marine shell beads (*Busycon sp*.), three "pear-shaped" shell beads, and "twenty flat crescent-shaped ornaments of shell…pierced at one end" (Kelly 2004: 279, citing Howland 1877). Kelly (2004) hypothesizes that these materials, as they were wrapped together in matting and fabric, were likely from a bundle associated with the buried human remains. Additionally, Howland noted that the materials were placed on some sort of alter, or small platform.

One additional feature identified by Howland was described as a trench-like burial and contained marine shell debris that included cut columellae from the process of making shell cups or beads (see Pauketat 1993; see also Kelly 2004). McAdams (Kelly 2004: 280) excavated this area some time later (no exact date) and identified four/five adults buried in an extended position (east to west) with a “number of whelk whorls.” Additionally, McAdams also uncovered “a central figure [found] wrapped in a woven grass mat with a bison skull and a large number of copper implements and ornaments” (Kelly 2004: 280). It has been suggested (Kelly 2004:280) that this particular individual was the foundational and primary burial of the Mitchell Mound, akin to the ‘beaded blanket’ burial of Mound 72. This interpretation, however, is likely misguided as more recent excavations and re-analyses of ridge-top mounds indicate that there was never just one foundational burial, but rather a complexity of interments that initiated the mortuary mound process. One final burial was identified on the lower mound level and consisted of a series of multiple individuals placed on a light colored sand layer (the initial mound construction episode) that included a Cahokia cordmarked sherd dating at least this burial event the Moorehead phase.

The Great Mound is unique in the amount of copper, mica, and copper-covered items recovered from multiple burial contexts and different sequences of construction events. To quote Kelly (2004: 281), “in many respects, this Mitchell site mortuary complex represents the largest and most diverse concentration of copper in the region.” Original descriptions from Winters (1984) (as cited by Kelly 2004) also cite the intricate layering of soils and mortuary contexts within in the mound itself where the sand layer beneath the mound possibly served to ‘purify’ the location prior to the construction of the mortuary complexes and subsequent mound layers. Overall, The Great Mound provides one more example of Cahokian ridge-top mortuary practice that began with a foundational surface, building, or mortuary feature and ended with a ridge-top cap.

PREVIOUS INTERPRETATIONS of RIDGE-TOP MORTUARY MOUNDS

The afore-discussed Cahokian ridge-top mortuary mounds have consistently been a topic of research and scholarship since Moorehead began his archaeological investigations and surveys in the early 1920s (see Alt and Pauketat 2007; Brown 2003, 2010; Fowler 1997; Fowler et al. 1999; Goldstein 2000; Kehoe 2007; Hall 1997, 2000; Pauketat 2010, 2013a; Porubcan 2000). Common interpretations often use ethnographic analogy (see Hall 1997, 2000; Kehoe 2007), a political and economic perspective (see Ahler 1999; Ambrose et al. 2003; Brown 2003; Fowler 1999; Pauketat 1997, 2004; Porubcan 2000; Trubitt 2000; Watson 2000) or one steeped in ritual/religious practice as analytical tools to decode ridge-top mortuary mound events (see Hall 1997, 2000; Pauketat 2010, 2013a; Watson 2000). Often, these mounds are discussed in isolation as singular events marking particular locations on the landscape, periods of time, or as elite mortuaries secluded from the rest of Cahokian society.

Mississippian, and in particular Cahokian archaeologists, frequently employ ethnographic analogy to analyze the aforementioned ridge-top mounds, seeking answers to and reasons for the elaborate burial programs identified, excavated and recorded at each (see for example Brown 2003, 2007; Hall 1997; 2000; Kehoe 2007; Lankford 2007; Peregrine 1996; Reilly 2007). The proponents of this method argue they make the 'unknown' of archaeologically recovered data know, by drawing correlations between two temporally distinct Native American communities typically identified in the same geographical location. This attempt to draw conclusions about similar practices across centuries maintains bias and affects ones ability to adequately examine materials and contexts without pre-conceived notions and expectations.

Instead of applying contemporary/ethnographic Native American practices and experiences directly onto past societies as if nothing changes, a critical evaluation of such practices through a 'New Animism' or relational ontological perspective allows for an examination of the world where things are inherently related; where archaeologists can move beyond one to one correlations and typologies to engage with the relationships created and maintained between people, places, and objects (see Baires et al. 2014; Pauketat 2008, 2013a; see also Zedeño 2009: 407). This approach is less concerned with identifying similar practices, 'rituals' and events across time, and more concerned with attempting to understand past activities. This becomes a much more useful method of analysis, one that considers context, history and agency in understanding and identifying the reasons for and meanings of past practices and events. Although the following few authors do not participate in this ontological method directly (with the exception of some of Robert Hall's work), they do provide useful and insightful information about Plains and Eastern Woodlands mortuary practice and religious belief. When examined on their own as examples of they ways Native persons relate to their dead and to the cosmos, these examples can provide a broader context within which to analyze and interpret Cahokian mortuary practice and religious belief.

Robert Hall's work, which often focuses on religious belief and ritual practice, allows for scholarship that seeks explanations to Cahokia's existence that were not only economic or political but experiential and religious (see Hall 1997). His work frequently draws correlations between 'historic' Native American (Plains, Southeast, Southwest, Mesoamerica) practices and Cahokia, seeking the origins of the earth mother, creation stories, and mortuary practices (Hall 1997; see Pauketat 2001:5). Hall, early on, was critical of ethnographic analogy as the *only* tool for interpreting the past stating, "ethnographic analogies cannot provide all the information necessary for such understandings" (1977: 502). He did, however, support its use in conjunction with the archaeological record; "[u]sing clues from the ethnographic record and a broad regional, deep time perspective, I believe it is possible to infer a structure of symbolic meaning from many archaeological remains" (1977: 500). Hall's work shares similarities in perspective with Irving Hallowell's early work; Hallowell (1926:9-10, emphasis original), a proponent of the ontological approach, states "we must rebuild the specific content of these categories upon the foundation of *their* beliefs, not ours". Hall's work presents ideas and connections that 'paved the way' for a perspective that currently incorporates Native American ontology in the analysis of Cahokia mortuary practices (see Pauketat 2013a; see also Baltus and Baires 2012).

In particular reference to Mound 72, Hall focuses on the possible correlation between an Aztec (and later Pawnee and Cherokee) practice (Green Corn Ceremony) and the four headless and handless men buried in 72Sub3 (F 106). He argues that the presence of these men are a direct link to the myth of the Aztec goddess of corn (Xilonen): four men were sacrificed to become the platform upon which a young women representing Xilonen was to be sacrificed in preparation and celebration of the busk (Hall 2000: 246-248). The four headless and handless men, for Hall, were not significant on their own but rather, were important when considered as a group that included the nearby pit of women (F 105) representing Xilonen; the two burials together present a convincing argument that this burial in particular was an elaborate performance of the Aztec ceremony (Hall 2000). When considering this perspective one must keep in mind that the Aztec post-date Cahokia approximately 200 years. Hall's explanation for this temporal discrepancy is that the Aztec rite likely originated with the Toltec (AD 900-1200) who were contemporaneous with Cahokia, providing a link between Native American practices in what is now the United States and the practices of groups in central Mexico (2000: 251).

Additionally, Hall (1997, 2000; see also Pauketat 2010) draws comparisons between the Morning Star Sacrifice of the Skiri Pawnee (and possibly also the Aztec) and what had been argued to be two central men (although now one is female [Hedman P.C. 2013]) buried with the falcon shaped beaded blanket in 72Sub1, F 101. The individuals associated with the 'beaded blanket' likely embodied the Morning-Star god (or Xipe Totec: the Flayed Lord) with the additional Mound 72 mass burials representative of the Morning Star Sacrificial victims (e.g. sacrificial pits of women). This rite involved the sacrifice of a female by the arrow of the Morning-Star god, related to fertility and the growing of corn (see Hall 1997: 87, 166). Hall (1997: 167) argues that the Morning Star Sacrifice "because of its representation in the Spiro site shell engravings...must have had a presence in the area of the trans-Mississippi Southeast by early Mississippi times." This was based in the notion that Xipe was associated with agriculture in Mesoamerica and it would be logical to trace the appearance of this rite to the Plains, with dates no earlier than the Mississippian period and the beginning of intensive maize agriculture in the Eastern Woodlands (Hall 1997: 167).

Similarly, Alice Kehoe (2007, 2010) presents an additional perspective of Cahokian religion and mortuary practice based in ethnographic analogy with ties to Mexico. She argues that Cahokia, not unlike Chaco Canyon in the southwest, traded with early Postclassic communities in Mexico in slaves, deer hides, and filed human teeth (2010: 1). Kehoe also identifies a link between the Dhegihan Siouans, citing the Osage Wa-Xo'-Be (ritual objects [Brown 2010: 104]) war ritual (as recorded by La Fleshe [1939]) as explanation for the "horrific scale of human sacrifice in Mound 72" at Cahokia (2010: 1; see also 2007). The Wa-Xo'-Be war ritual, to Kehoe, is "uncannily like" the burials in Mound 72 and in each of the sacrificial pits and the litter burials Kehoe identifies a link to the war ritual as recorded by La Fleshe (1939). As the Wa-Xo'-Be bundle is unrolled one recites the story, which tentatively follows the burial pattern present in Mound 72, culminating with "the man on a blanket in the shape of a dead hawk" which corresponds to the location of the actual hawk kept in the Wa-Xo'-Be bundle (Kehoe 2010: 9). The war chant follows a pattern describing different groups of people ("youth in his adolescence"/ "maiden in her adolescence"/ "man who is honored for his military achievements"/ "woman who has given birth to her first child"), which Kehoe sees identified in the various pits and burial features in Mound 72 (four headless and handless men, the sacrificial pit of women, litter burials, Hawk burial) (Kehoe 2010: 257). Ultimately, Kehoe argues that Mound 72 is the "cosmological shrine of the Wa-Xo'-Be and the genocide the Cahokian's intended for their enemies" (Kehoe 2010: 257).

Additionally, scholars like James Brown (2010) and Robert Hall (1997, 1983) have likened what they argue to be the central burial of Mound 72 (the 'Birdman' or 'Hawk Man') to the ichnographically represented/depicted Bird Man or the mythical Red Horn figure (also the Thunderer Twins [Pauketat 2010]). The Birdman is not only embedded in Mound 72 mortuary practice but seen elsewhere at Mississippian period sites on pottery and pictographs (Brown 2007; Brown and Kelly 2000). These male deities are often cited back to this 'central' burial because of their obvious relationship to the falcon-shaped beaded blanket ensconcing them. Derived from the Osage, this 'symbolic hawk' symbol represents the warrior, ensures a lengthy and healthy life, and is tied to the sky-the sun, the moon, and the cosmos (Brown 2010: 56; see also La Flesche 1939). Not surprisingly these similarities are used to argue that this specific burial represents high-status men who are the central fixture of the burials in Mound 72. This conclusion is then extrapolated to suggest that Cahokian religion and ritual is centered on these two males (see Brown 2010, 2007; Fowler et al. 1999; Emerson 1997; Hall 1997). Besides the fact that one of these two males is now likely a female, this extrapolation presents a skewed interpretation of past mortuary practice, one that highlights notions of 'eliteness' and 'maleness' only (see Slater et al. 2014).

In addition to interpretative perspectives that employ ethnographic analogy, Cahokia's economy has been discussed as part and product of an intricate web of elite relationships maintained within and outside of the city's central precinct via mortuary display. Mound 72 is often used as an example of this type of economy, one based in ritualized behaviors and the exchange and caching of unique and exotic goods. The accumulation of exotic items like marine shell, nonlocal chert, mica and copper suggests Cahokian elites placed an importance upon far-flung trade and social interaction (see Emerson 1997; Fowler 1991; Fowler et al. 1999; O'Brien 1991; Pauketat 1997). This model of Cahokian interaction spheres is predicated upon the 'complexity' of a community and the distribution of artifact types throughout a large area. Fowler (1991: 14) argues that this model is highly visible in the mortuary contexts of Mound 72, "[i]n the caches and burial offerings are representations of both the extent of the economic interactions of Cahokia and the status of the individuals buried with the grave goods". For Fowler, the exotic artifacts present in the elite burials at Mound 72 directly correlate to the status of the buried individual and speak to the wide economic range of exchange *he* (not she) was involved in.

John Kelly (1991) similarly argues that an intensification of economic exchange, as materialization by the burial goods interred in Mound 72, is directly related to the rise of Cahokia and its increase in complexity. Kelly (1991) argues that ritual production, local exchange and far-flung trade are all characteristics of a complex political economy changing through time, identifiable archaeologically in the acquirement of prestige through exotic objects, materials and foreign territory. Marine shell beads are one of the best examples of this increase in extensive and presumably socially expensive trade relationships; although the beads were produced at Cahokia the type of marine shell used indicates Cahokian elites had extensive trade networks outside their community to support their quest for power (Kelly 1991, 2006). For Kelly, rise in political domination and power is directly related to "its role in a number of different webs of exchange that operated both locally and externally" (1991: 87). By accumulating marine shells for the production of jewelry and capes/blankets, elites signaled their own authority over the local community and expansive trade networks (see Anderson 1994;

Peregrine 1992).

For Milner, the segregation of elite burial contexts in ridge-top mounds was a direct product of hierarchical social and economic relationships. He argues that, "the differential distribution of high-quality items, especially elaborate artifacts fashioned from exotic raw materials that served as symbols of exalted status, is well documented" and unique to elite mortuary contexts (Milner 1991: 38; see also 1984). Available evidence, primarily from Mound 72, suggest these items were acquired and retained by members of the elite class circulated among socially important groups within and outside the Cahokia precinct (Milner 1991; see also Brown et al 1990; Porubcan 2000). According to Milner (1991), the ability to obtain ritual exotics visually legitimized elite authority and their power over surrounding peripheral communities.

Shifting the focus from what the Mound 72 burial goods represent to what the dead individuals buried in ridge-tops represent, Porubcan (2000) and Goldstein (2000) argue that Mound 72 was a display of corporate/collective identity and ancestral lineage as reflections of a particular group history. Using the grave goods and bodies as markers, Porubcan suggests that "primarily corporate, rather than individual" statuses were the focus of this intricate burial mound, one that emphasized the importance of an elite kin group with connections to the "outer world" (2000: 213). The specialized materials included with the burials represent the access elite kin groups (who were buried together in Mound 72) had to expansive trade networks and skilled manufacturers of projectile points, marine shell beads, and copper items. Porubcan additionally suggests that the beaded blanket burial was "of the highest status in this mound…and anyone at a later time claiming a relationship to Burial 13 would benefit from the outer world relationships demonstrated through this mortuary event" (2000: 214). Similarly, Goldstein (2000: 203) argues that Mound 72 rituals "focused on the group, rather than the individual…which uses human bones as symbols for groups and social histories" establishing a knowledge of collective history as well as prestige and power. Both perspectives suggest that Mound 72 mortuary ritual was reserved for a particularly high status group, not everyone would have had access to these practices, which maintained hierarchical social organization and differential access to group histories and lineages (Goldstein 2000: 204).

Brown (2003: 93) also argues that Mound 72 burials represent collective identity, with the beaded burial complex serving as the central fixture of a cosmological and political narrative. In particular, Brown (2003: 94) focuses on the lack of an individual identity retained by the dead when buried in the Mound 72 complex, emphasizing their 'new' roles as props in a "collective reenactment…in which the mourners could invoke the power of the archetypical mythic ancestor to affect some positive benefit both to the descendants and to other mortuary participants".

The aforementioned models of Cahokian exchange and ritual economy all focus on the synchronic activity of burying the dead and the singular event of including exotics and ritual goods with each burial. They focus on the role of trade as a mechanism for expansion and for the legitimization and creation of power (Brown 2003, 2006; 2010; Fowler 1991; Goldstein 2000; Kelly 1991; Milner 1991; Porubcan 2000). These past examinations of ridge-top mortuary practice do not engage with historical context; Mound 72 is explained as a singular, isolated event. Pauketat (2010) suggests instead, that to attempt to understand the happenings at these ridge-top monuments we must not forget the agency of both the dead and the living as actors in a broader performance, whereby the materials interred with the dead and the dead themselves constitute persons with the ability to effect change (see Alberti and Bray 2009). Such persons "lead us to investigate the causal relationships between social experience, cultural practice, or political performance and the larger contours of human history" (Pauketat 2010: 16). Ridge-top mounds were active locales of change and it is in the relationships between persons (both alive and dead), objects, and place that provide insight into the root of that change (Pauketat 2010).

DISCUSSION

Based on previous archaeological work at ridge-top mounds from the Cahokia, East St. Louis, St. Louis and Mitchell precincts, the construction and use of ridge-top monuments is estimated to span the Lohmann to Stirling phases (AD 1050-1150). Ridge-tops were built in a series of relatively sequential construction episodes (rapid in execution), generally consisting of alternating layers of light and dark fills, basket loads, mantle deposits, and preliminary core mounds (see Ahler and DePuydt 1987; Fowler et al. 1999). Construction typically began with a pre-mound occupation that included an isolated wall-trench (or post-hole) structure (Mound 72, Cemetery Mound), pre-mound village occupation (Powell Mound), or monumental marker posts (Mound 72, Powell Mound, Mitchell Mound). All the aforementioned mounds include human remains and material items like shell beads, projectile points, and chunkey stones, and were oriented with their long axes west to east (with the exception of Mound 72) (Table 4.4).

Alignments between monuments are also observed, for example Rattlesnake Mound, Mound 72 and Mound 49 align along the Rattlesnake Causeway and Cahokia's 5^{o} offset grid. Powell Mound and Mound 2 form a west to east line that intersects with the southern edge of Monks Mound. The majority of the Cahokia precinct ridge-tops were built along Cahokia's known boundaries within visual distance of Cahokia's central precinct (Rattlesnake, Mound 72, Mound 49, Powell Mound). The ridge-tops present in the Mitchell, East St. Louis and St. Louis precincts were similarly oriented with long axes east to west, along the edges of the mound and plaza complex of their respective precincts.

Van Dyke and Alcock (2003: 1) state, "…past peoples knowingly inhabited landscapes that were palimpsest of previous occupations" where knowledge of past practice and experience were maintained through and in the landscape. Ridge-top monuments literally constructed the known landscape of Cahokia city setting up and marking site alignments and precinct boundaries, connecting Downtown Cahokia with the East St. Louis and St. Louis precincts. The construction and use of ridge-tops spanned approximately 100 years (AD 1050-1150) evidenced in the construction of these mounds across four precincts, the aboriginal re-excavation of mounds like Mound 72 and Wilson Mound, and the continued deposition of materials and human remains over a span of (in the case of Mound 72) at least 100 years.

The similarities identified across these mounds are displayed in Table 4.4 and include burial type, the presence or absence of a sub-mound building, methods of mound construction, and feature types associated with each mound construction sequence. In particular, Wilson Mound, Mound 72, Cemetery Mound and possibly Big Mound included a pre-mound building, built, used, and decommissioned prior to the sequence of mound construction events. Five of the mounds (Wilson, Mound 72, Rattlesnake, Powell, The Cemetery Mound) share evidence for the construction, decommissioning, and subsequent burial of multiple bundled individuals on top of a small wall-trench structure. Seven ridge-tops (Wilson, Rattlesnake, Powell, Mound 72, Cemetery Mound, The Big Mound, The Great Mound) contained burials of multiple individuals interred in three specific styles (bundled, extended, and mass burials); all of the eight documented mounds shared similarities in construction method, including basket loading, mantle deposits, zoned fills, and the construction of core mounds. Seven of the eight mounds (Rattlesnake, Mound 72, Wilson, Powell Mound, The Big Mound, Cemetery Mound, The Great Mound) contained intentional cached deposits of pottery, shell beads, and lithic materials. Mound 72 and possibly the Mitchell and Cemetery Mounds, however, were the only ridge-tops to contain such a variety of unique goods and burial contexts indicative of non-local participation (see Fowler et al. 1999).

The shared features and chronological sequence of these mortuaries support the conclusion that ridge-top mounds were instrumental to the construction and maintenance of the city of Cahokia. Although data for only 8 of 17 documented mounds is available, the shared characteristics among the eight demonstrate a complexity of religion; one based in ancestor veneration, mound construction and renewal, and celestial alignments (see Brown 2010; Emerson and Pauketat 2008; Pauketat 2010; 2013a). Additionally, the small deviations identified at each ridge-top indicate that this complexity of religion was constituted by a shared knowledge of how to build these mounds, and the ability of the builders themselves to interpret that knowledge differently. This is exemplified at Wilson Mound where we see a pervasive use of shell and the intentional disarticulation of bodies, something not replicated at other ridge-tops. Mound 72, Powell Mound, and Rattlesnake Mound do have evidence of the burial of disarticulated remains, but not on the same scale as Wilson Mound. Importantly, these slight deviations indicate that groups of people at once shared knowledge of ridge-top mortuary practices but also re-interpreted that knowledge at each mound creating relational and unique spaces. These ridge-tops were the 'doings', the practices, and the relationships that constituted the emerging city of Cahokia.

Based on the material, mortuary and locational evidence, ridge-top mounds were seminal, roughly contemporaneous events and places organizing Cahokian space ca. AD 1050. Based in a New Animism perspective, ridge-tops were not monolithic *representations* of belief, but dynamic spaces constantly in negotiation (*sensu* Emerson and Pauketat 2008). Moving beyond representational models and theories allows for a consideration of the historically contingent practices that were part of the process and creation of Cahokia, of which ridge-top mortuaries were a part (see Pauketat 2013a). The shared knowledge of burial practice (as an extension of religious belief) is obvious, but also equally important are the small divergent details indicative of variations in interpretations and execution of religion/mortuary practice that emphasize relationships with people from different locations (Mound 72), the caching of thousands of shell beads (Wilson Mound), and the burial of ancestor bundles (Rattlesnake Mound, Wilson Mound, Powell Mound, Cemetery Mound, The Big Mound).

These diverging characteristics could be reflections of changes where knowledge of a particular event or practice was slightly changed with each new interpretative event- like the placing of a new layer of soil, the excavation of a intrusive burial pit, or the final capping of a ridge-top; or these practices could be reflections of the different communities and families who participated in the construction and maintenance of each monument (see Mills and Walker 2008; Pauketat 2008). It is important to account for "differential knowledgeability" in contexts such as mortuary mounds, where the knowledge of the past is almost certainly "bound up in relations to persons [both dead and alive] and things" (Joyce 2008: 26). From a historical perspective, and one that considers ridge-tops as generative of cultural change, such mortuary events potentially called upon memories where depositional practices (like excavating an intrusive burial pit) recalled and re-interpreted past ridge-top mound activities and persons (*sensu* Pauketat 2008). In this context, religion (as something correlated to mortuary practice and ridge-top mound construction) is both shared and individualistic in nature (see Wesler 2012) and "the participants in such rites would have brought their varied understandings and religious practices to bear on the central event" as they were involved in the creation and negotiation of meanings and practices enacted in ridge-top mound activities (Emerson and Pauketat 2008: 176).

FIGURES

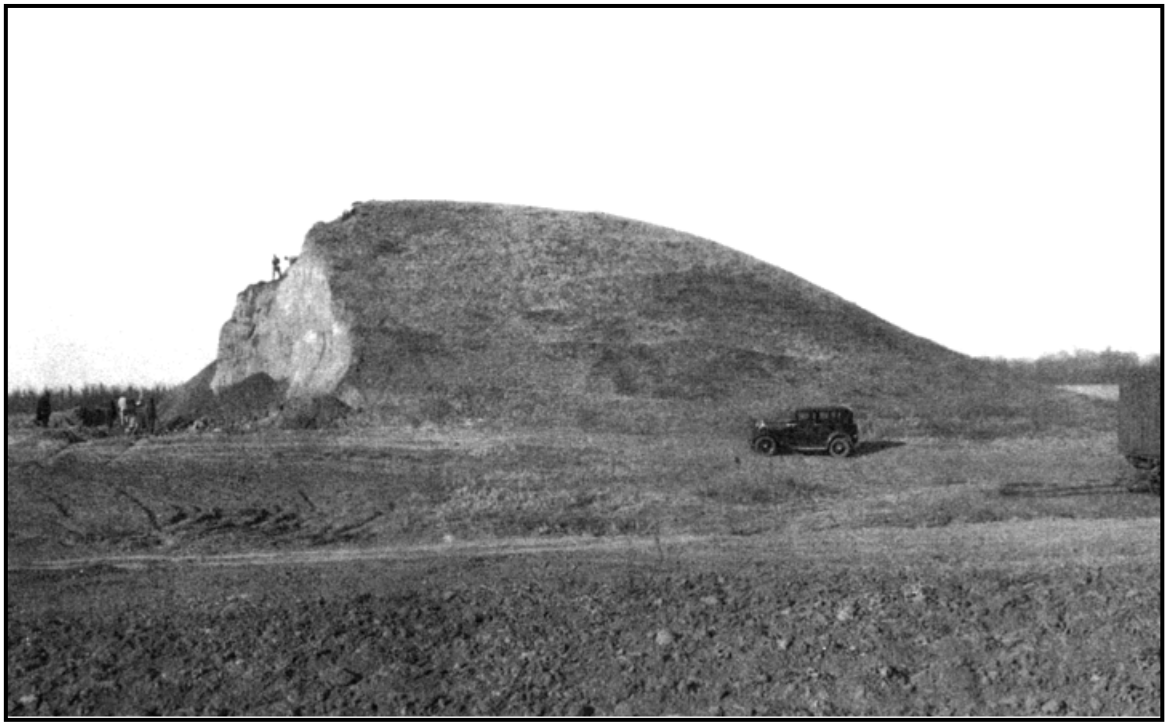


Figure 4.1 Powell Mound During Destruction, 1930-1931 (photo used with permission ISAS)

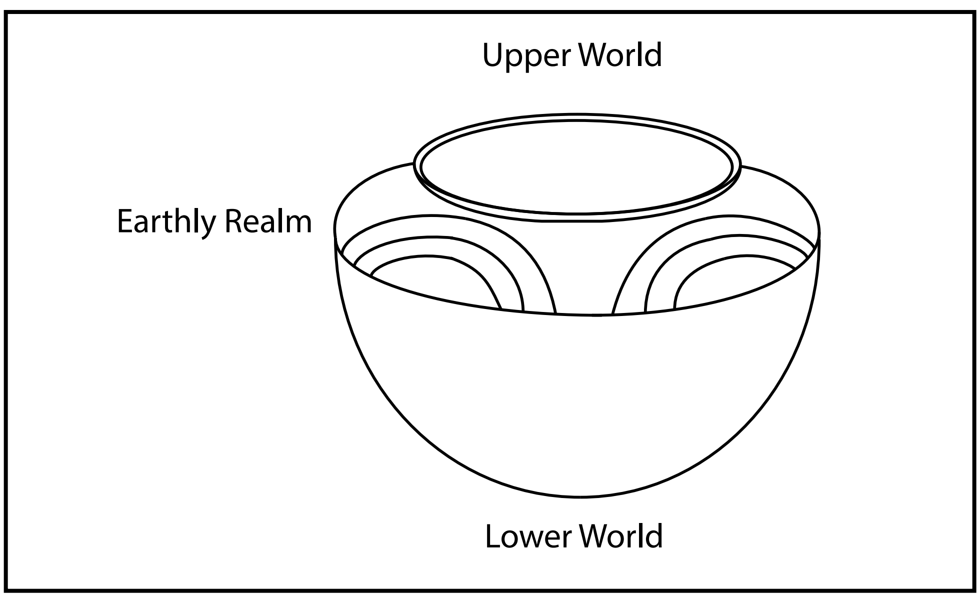


Figure 4.2 Ramey Style Pottery Vessel depicting Tri-partite Division of the Cosmos

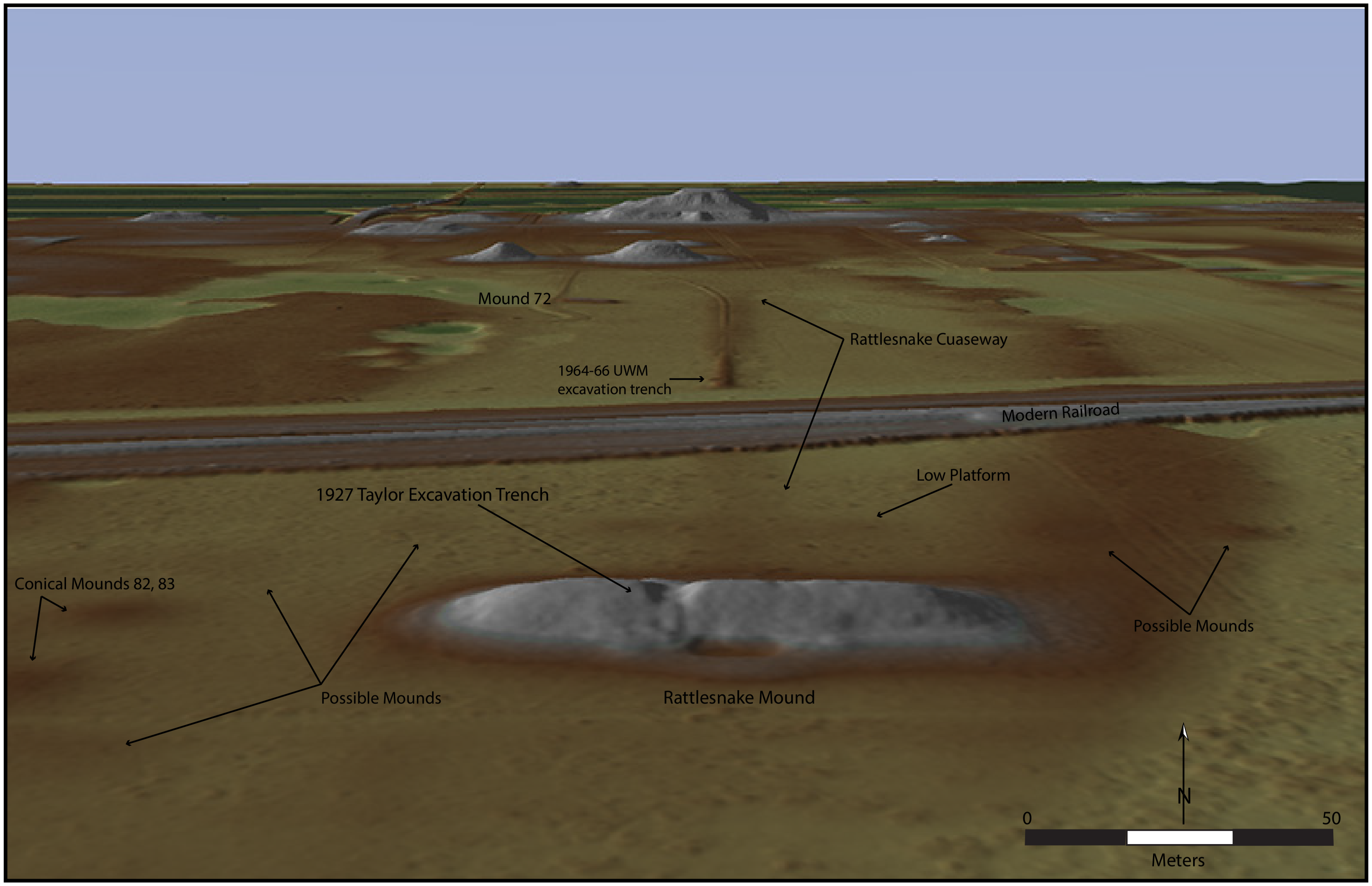


Figure 4.3 Rattlesnake Complex including Rattlesnake Causeway and surrounding Mounds (image courtesy ISAS)

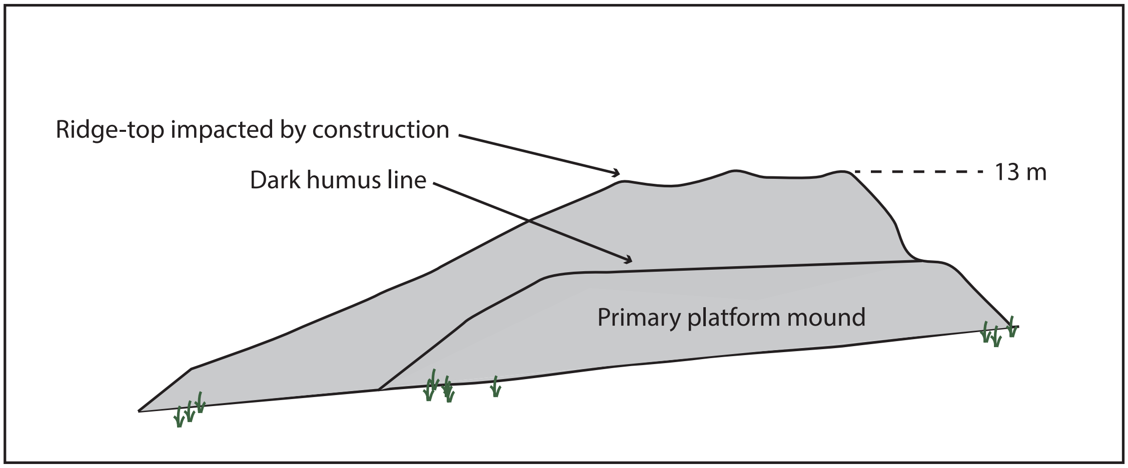


Figure 4.4 Powell Mound schematic showing two-stage construction sequence: ridge-top impacted by modern construction, and primary mound surface

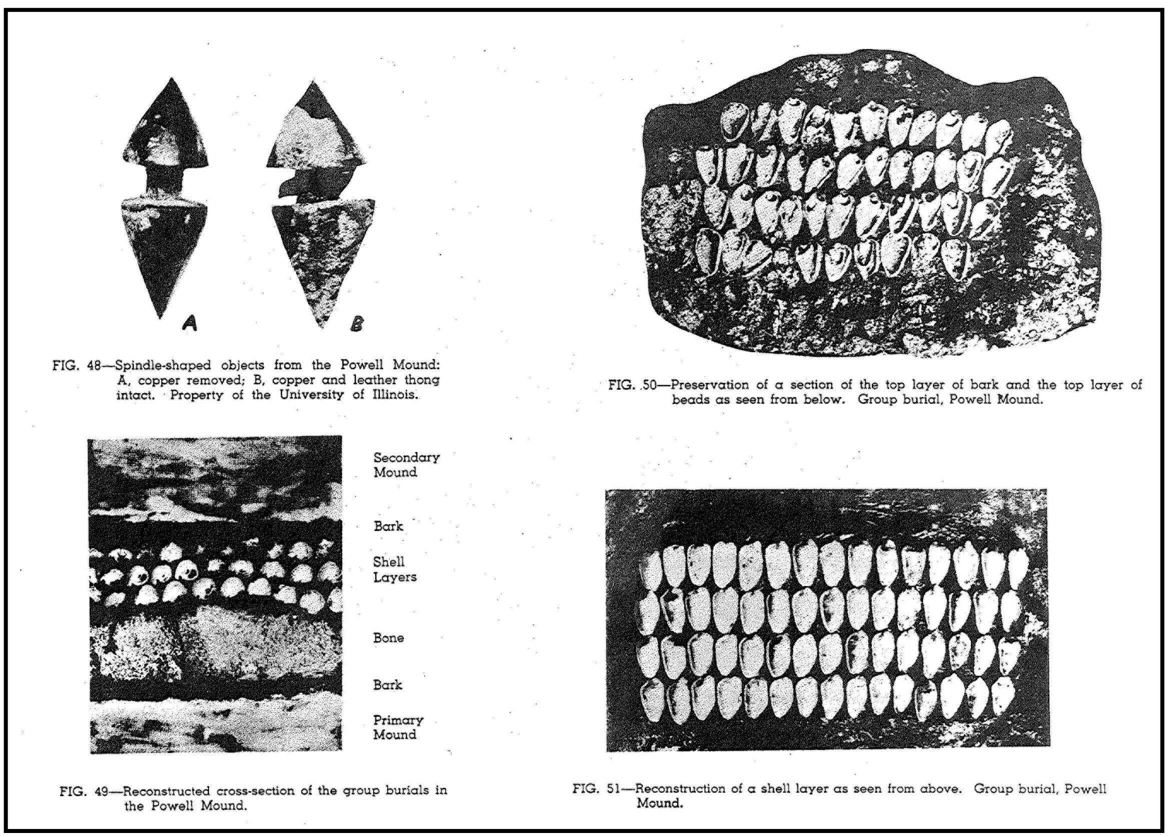


Figure 4.5 Powell Mound Artifacts from Mortuary Context (left to right, top to bottom): copper covered ear spools; shell beads, mortuary feature stratigraphy; reconstructed shell beads from mortuary context (Titterington 1938: 40)

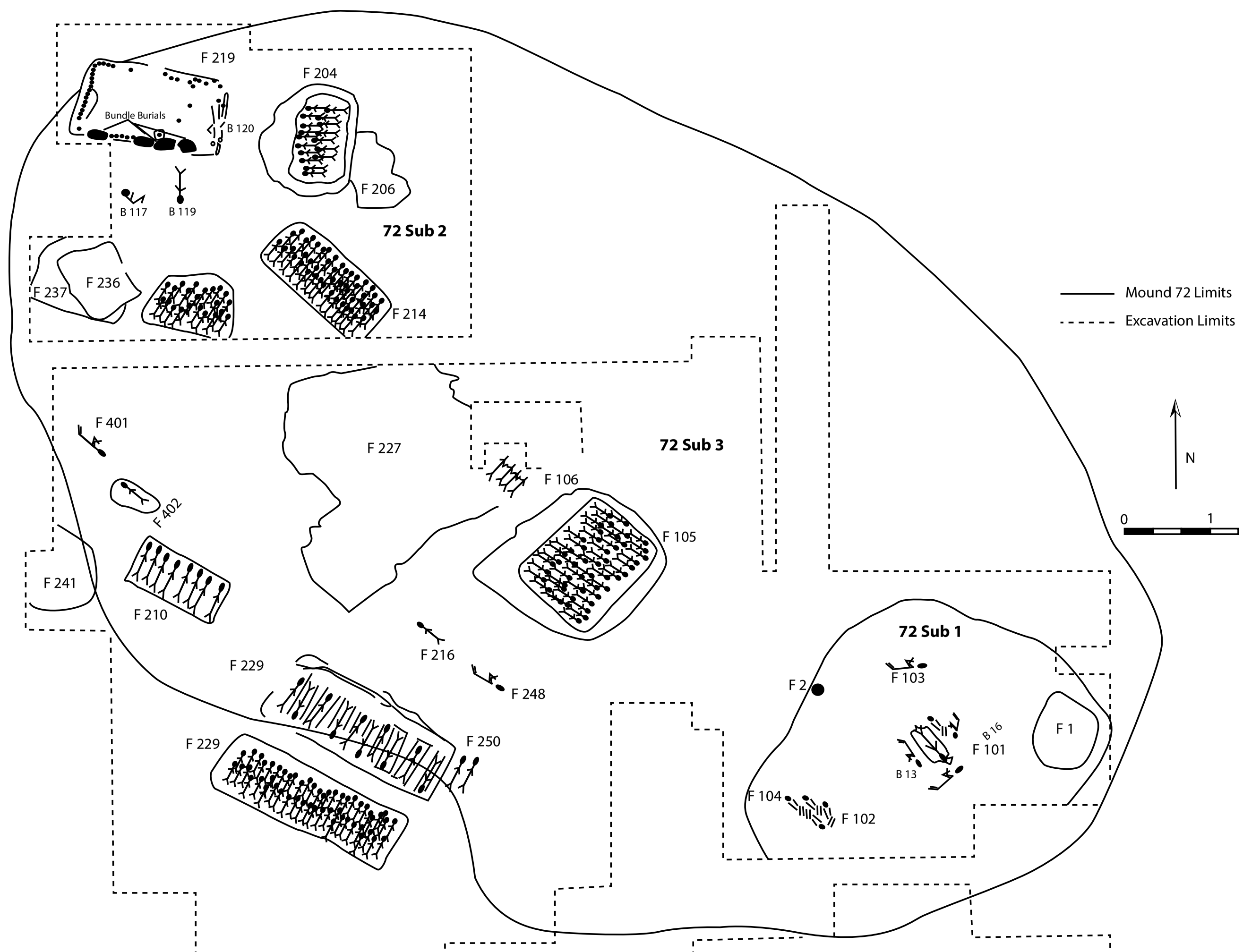


Figure 4.6 Mound 72 Plan Map depicting 72Sub1, 72Sub2, and 72Sub3

TABLES

Mound	Location	Other Name	Chronology
Mound 2	Cahokia	-	Unknown
Mound 49	Cahokia	Red Mound	Lohmann-Stirling
Mound 64	Cahokia	True Rattlesnake Mound	Unknown
Mound 65	Cahokia	-	Unknown
Mound 66	Cahokia	Rattlesnake/Harding Mound	Lohmann-Stirling
Mound 72	Cahokia	Red Pottery Mound	Lohmann-Stirling
Mound 79	Cahokia	Jondro Mound	Unknown
Mound 81	Cahokia	-	Unknown
Mound 85	Cahokia	-	Unknown
Mound 86	Cahokia	Powell/Hayrick Mound	Stirling
Mound 88	Cahokia	-	Unknown
Mound 95	Cahokia	-	Unknown
Unumbered Mound	Cahokia	-	Unknown
Wilson Mound	Cahokia	Junkyard Mound	Lohmann-Stirling
Cemetery Mound	East St. Louis	-	Stirling
Big Mound	St.Louis	Le Grange Terre	Stirling?
Mitchell Mound	Mitchell	Great Mound	Late Stirling

Source: Fowler 1997; Pauketat 2010

Table 4.1 Known Ridge-top Mounds from Cahokia, East St. Louis, St. Louis, and Mitchell Precincts

Sk #	Accession #	Provenience	Age		Sex	Cranial	Teeth	Upper Limb	Lower Limb	Torso
CPC1	3491/92	Md86-BP*	Child	4-5 yrs	-	√	√	√	√	-
CPC2	3492	Md86-BP*	Infant	0-1 yrs	-	√	-	-	√	√
CPC3	3492	Md86-BP*	Young Adult	30-35 yrs	-	√	√	√	√	√
CPC4	3495	Md86-BP*	Adult	>20 yrs	-	√	-	-	-	√
CPC5	3495	Md86-BP*	Adult	>20 yrs	-	√	-	√	√	√
C1	3491	Md86-BP*	Young Adult	30-35 yrs	-	-	√	-	-	-
C2	3491/92	Md86-BP*	Subadult	15-16 yrs	-	-	√	-	-	-
C3	3520	Md86	Middle Adult	30-45 yrs	F	√	-	-	-	-
C4	3521	Md86	Young Adult	20-25 yrs	M	√	√	-	-	-
C5	3521/23	Md86	Middle Adult	>35 yrs	F	√	-	-	-	√
C6	3522	Md86	Young Adult	25-35 yrs	M	√	√	-	-	-
C7	3523	Md86	Young Adult	20-30 yrs	M?	√	-	-	-	-
C8	3524	Md86	Middle Adult	40-50 yrs	M	√	√	-	-	-
PC1	3496	Md86-BP*	Adult	>20 yrs	-	-	-	√	√	-
PC2	3503	Md86	Adult	>20 yrs	-	-	-	√	√	-
PC3	3519/54	Md86	Adult	>20 yrs	-	-	-	-	√	-
PC4	3544	Md86	Adult	>20 yrs	-	-	-	-	√	-
PC5	3554	Md86	Adult	>20 yrs	-	-	-	-	√	-
PC6	3554	Md86	Subadult	12-13 yrs	-	√	-	-	√	-
PC7	3555/56	Md86	Young Adult	25-30 yrs	M	-	-	√	√	√
PC8	3556	Md86	Young Adult	20-30 yrs	-	-	-	-	√	-
PC9	3557/58	Md86	Middle Adult	30-35 yrs	F	-	-	√	√	√

Powell Md86 (Powell Md 1, large) - Deuel Winter 1930-31
*BP - Md 86 Burial Platform
CPC - cranial and postranial set; C - cranial set; PC - postcranial set
Anaylsis JAB
Source: Bukowski et al. 2011 (report on file ISAS)

Table 4.2 Summaries of Skeletons, Powell Mound

Accession #		Proven-ience	Prov. Label	Element	Side	Segment	Preser-vation	Age		Sex	Comments
3494	-	Md86-BP*	-	Cranium	R	temp., parietal	3	Adult	>20 years	-	-
3495	-	Md86-BP*	MH86	Rib	-	shaft frag.	3	Child	3-7 years	-	-
3496	-	Md86-BP*	-	RI^2	R	complete	1	Young Adult	20-24 years	-	-
3519	a-2	Md86	-	Femur	R	complete	1	Adult	>20 years	?	-
3519	a-5	Md86	-	Femur	R	complete	1	Adult	>20 years	?	-
3519	a-7	Md86	-	Femur	R	complete	1	Adult	>20 years	?	-
3519	a-6	Md86	-	Tibia	R	complete	1	Adult	>20 years	-	-
3522	a-25	Md86	-	Cranium	-	parietal	3	Adult	>20 years	-	does not match a-22, 23
3524	a-29	Md86	-	Cranium	R	frontal-orbit	2	Adult	>20 years	F	-
3544	a-35	Md86	-	Humerus	R	proximal 1/2	2	Adult	>20 years	-	-
3544	a-31	Md86	-	Femur	L	distal 1/3	2	Adult	>20 years	-	-
3544	a-33	Md86	-	Femur	R	diaphysis	2	Child	7-12 years	-	-
3544	a-37	Md86	-	Femur	L	distal 1/2	2	Adult	>20 years	-	does not match a-34
3554	a-17, 18	Md86	-	Cranium	R	occipital, zygoma	2	Young Adult	20-35 years	?	-
3554	a-12	Md86	-	Tibia	L	complete	1	Adult	>20 years	-	-
3556	b-73	Md86	-	Radius	R	complete	1	Adult	>20 years	-	does not match b-76
3558	-	Md86	-	Lunate	R	complete	1	Adult	>20 years	-	duplicate element

*BP - Md 86 Burial Platform

Analysis by JAB

Preservation: 1 > 75% present; 2 = 25-75%; 3 <25%

Source: Bukowski et al. 2011 (report on file ISAS)

Table 4.3 Summary of Isolate Human Remains, Powell Mound

Ridge-top Mound	Chronological Phase	Mound Construction Technique(s)	Sub-Mound Building Y/N	Sub-Burial Building Y/N	Burials Y/N	Features
Rattlesnake Mound/Mound 66	Lohmann-Stirling	BL, M, ZF	N	Y, WT	Y, BB, MB	WT, Br, H
Powell Mound/Mound 86	Stirling	BL, ZF	N	Y, WT?	Y, BB, EB	Br, PP
Red Mound/Mound 49	Lohamann-L. Stirling	BL, M, L, ZF	N	?	N	WT, P, H, PstB
Wilson Mound/Junkyard Mound	Lohmann-E. Stirling	BL, M, ZF	Y, PstB/WT, LS	Y, WT	Y, BB, EB, MB	P, WT, LS, PstB, Br
Mound 72	Lohmann-E. Stirling	BL, M, ZF	Y, WT	Y, WT	Y, BB, EB, MB	WT, P, PP, Br
Big Mound	Stirling	?	Y, ?	?	Y, BB, EB	P, PP, Br
Cemetery Mound	Stirling	?	?	Y, ?	Y, BB	Br
Mtchell Mound	Late Stirling	?	?	?	BB	Br

Mound construction methods: BL: basket loading, M: mantle deposits, L: laminations, ZF: zoned fills

Features: P: pit, PP: post pit, WT: wall trench building, LS: l-shaped building, PstB: post hole building, Br: burial pit, H: hearth

Burials: BB: bundle burial, EB: extended burial, MB: mass burial

Table 4.4 Ridge-top Mound Features and Chronological Phase

CHAPTER 5

CONSTRUCTING MORTUARY SPACE: Rattlesnake Mound and Causeway

"A man could not quit his dwelling-place without taking with him the soil of his ancestors."

-Numa Denis Fustel de Coulanges, 1956

Continuing with the discussion of ridge-top mortuaries and associated features, next I investigate Cahokia's beginnings as intertwined with the planning and construction of one Cahokia's largest mortuary mounds (Rattlesnake). Importantly this includes the re-organization of the natural landscape ca. AD 1050 and the construction of the Rattlesnake Causeway. The following case materials consist of data from recent excavations into the Rattlesnake Causeway and Rattlesnake Mound (Mound 66) located along Cahokia's center axis approximately 1 km southwest of Monks Mound and the Grand Plaza (see Figure 2.5).

I begin with the Rattlesnake area to contextualize the mound and causeway within both the natural environment and the precinct of Cahokia in general; this is followed by excavation results from the Rattlesnake Causeway, which have important implications for Cahokia's overall site layout. Following the analysis of the causeway data, I discuss my excavations into Rattlesnake Mound presenting evidence to suggest that this large and southern-most ridge-top was constructed quickly and early in the established Cahokian chronology. Artifact data from both the causeway and Rattlesnake Mound are presented at the close of each section. Together, these lines of evidence (construction sequences/methods, chronological affiliation, location within Downtown Cahokia, and the orientation of the causeway) when compiled with the ridge-top mound data presented in Chapter 4 indicate that mortuary mound construction, and associated practices were entwined with Cahokia's emergence ca. AD 1050. Often "the foundation of a city was a sacred act" one built as "a sanctuary for this common worship" and embodied in the built landscape (Coulanges 1956: 134-135; see also Wentzel van Huyssteen 2010; see also Bloch and Parry 1982; Kuss 1989).

THE RATTLESNAKE AREA

Rattlesnake Mound is located approximately 1 km south of the Grand Plaza within what Demel and Hall (1998: 211) designate as "Tri-Mound Group G", which includes in addition to Mound 66, mounds 82 and 83: two small conical mounds flanking Rattlesnake Mound's western end (Figure 5.1, see also Figure 2.5). Demel and Hall's (1998) identification and use of the tri-mound groups to designate organizations of mounds in this area does not include all the possible mounds identified in and around Rattlesnake Mound; nonetheless it does provide a useful starting point in identifying the organizational layout of the southern Cahokia precinct. I use their designations as reference points to orient the discussion of the Rattlesnake Area; their designations are supplemented with a recent LiDAR map (Figure 5.2) to present a more complete view of all the possible mounds located in the Rattlesnake Area. Additionally, Fowler[1] (1997: 197) describes mounds 82 and 83 as "perhaps dedicatory mounds, although Moorehead's excavation into them did not produce evidence of burials." The results from Moorehead's 1920s test excavations into Rattlesnake Mound, mounds 82 and 83 were minimal, revealing the origins of these mounds to be aboriginal as opposed to natural.

Flanking and paralleling Mound 66 immediately to the north is a small, low platform (or possibly two small conical mounds) previously undocumented on original maps of Cahokia, but visible on LiDAR imaging (Figure 5.2). The low platform (or possible conical mounds) appears to be the nexus point for the Rattlesnake Causeway, which extends five degrees east of north for 752 m aligning Cahokia's organizational grid. In addition to the low platform (or two possible conical mounds) and mounds 82 and 83, at least an additional four other small conical mounds

[1] Fowler (1997) and Demel and Hall's (1998) original mapped locations of Mounds 82 and 83 are incorrect. Please see Figure 5.2 for the correct location of these small conical mounds.

are identifiable on LiDAR imaging, arranged in an L-shape along the north, west, and southwestern corner of Rattlesnake Mound (see Figure 5.2). These features, prior to LiDAR imaging, have not been documented or reported and present a unique arrangement of mounds not typically seen at Cahokia; an arrangement that challenges the hypothesized tri-mound organization proposed by Demel and Hall (1998) for the southern part of Cahokia.

In addition to the Rattlesnake Area (which now is hypothesized to include at least 9 mounds), 'tri-mound' groups D (mounds 69, 70, 71) and C (mounds 63, 64, and 65) are located northwest and northeast of the Rattlesnake complex respectively (see Figure 5.1; see also Figure 2.5). Mound 64, an additional small ridge-top mound oriented along the same 5^{o} offset as Rattlesnake Mound, is part of hypothetical group C and is still present on the landscape (see Figure 5.2). The southern face of Mound 64 was truncated (or at least covered over) by construction for the railroad tracks that currently bisect the Cahokia precinct (see Fowler 1997: 131).

Demel and Hall (1998: 210-211) describe these 'tri-mound' groups as "located along secondary site axes, or azimuths, out from the proposed north-south center axis of the Cahokian site." Although Demel and Hall's orientations reference Fowler's (1997) north-south alignment, which we now know to be incorrect by 5^{o} degrees (see Chapter's 2 and 4), the basic orientations between these monuments cannot be wholly discounted. The most recognizable and important orientation postulated by Demel and Hall (1998: 213) (see also Fowler 1997; Reed et al. 1968) is the alignment between Mound 66, and Mound 72 along Cahokia's center axis; Demel and Hall state that this alignment "creates a recognizable site organization and mound placement strategy."

It must be stated, though, that anyone with a ruler and a pencil can create alignments and patterned organizations among and between Cahokia's many mounds. Why I choose to emphasize the orientations of these mounds is because of the association of Mound 72 and Rattlesnake Mound to the Rattlesnake Causeway (which Demel and Hall [1998] had yet to identify) (see Figures 2.5, 2.6, 5.2). Mounds 72 and 66 were constructed in orientation to the Rattlesnake Causeway, with Mound 66 located at the southern end of the 752 m long feature and Mound 72 to the west of the causeway (see below). Where Demel and Hall (1998) focused on identifying strict cardinal or solstitial alignments (along with Fowler [1997]), it is more important to recognize that the Causeway orients Cahokia's 5^{o} offset, and that at least these two ridge-top mounds (all constructed during Cahokia's Lohmann to early Stirling phase) were accessible by traveling along this earthen feature.

The association of Rattlesnake Mound with the causeway is obvious, as it serves as the point of origin for this feature (see Figure 5.2). Possibly less obvious is the relationship between Mound 72 and the causeway; this small ridge-top is located approximately 75 m (0.4 miles) to the west of Rattlesnake Causeway, a short 6 minute walk if one assumes a moderate walking pace (measured from the southeastern corner of the mound across to the western edge of the causeway [see Figure 2.5]). To get to Mound 72 from the Rattlesnake Causeway, today, one sloshes through low, marshy wetlands with slightly elevated portions of land that provide pathways to access both the mound and the causeway.

As ridge-top mounds are documented to contain elaborate mortuary contexts (containing bundled, disarticulated remains as well as fully extended interments [see Chapter 4]), it is my hypothesis that the causeway provided a physical and spiritual way to transfer the dead (and associated materials) to their final place of burial (see Baires 2014; also see discussion below). This hypothesis is further supported by the location of Rattlesnake Mound (and associated mounds) and Mound 72. Demel and Hall (1998) note that these mound groups are associated with both artificially created water features and marshy ridge and swale natural topography (see also Dalan et al. 2003; see also Figure 2.5). Mound 72 is located on a slightly higher rise between a water-filled borrow pit and a marshy, low swale (see Figure 2.6). Importantly, Rattlesnake Mound is flanked immediately to the east by a low ridge (see Figure 5.2). Using LiDAR imaging to identify the elevation of the land surrounding Rattlesnake Mound, it is possible to discern that Cahokian builders built up the low area where Rattlesnake Mound now sits, extending the natural ridge to the west for the length of Rattlesnake Mound (approximately 132 m). Referring to Figure 2.6, the elevation of the natural ridge is between 127.1-128.0 m asl; the elevation of the land surrounding Rattlesnake Mound is between 2-3 m lower (125.7-127.1 m asl) than the nearby ridge. The ground immediately underneath and bordering Rattlesnake Mound is as high as the natural ridge and is almost exactly the length and width of Rattlesnake Mound suggesting that Cahokian's artificially elevated this area of land in preparation for the construction of Rattlesnake Mound (see Chapter 2 for evidence of this type of landscape modification). The artificial elevation of the ground underlying Mound 66 raises the base of this ridge-top an estimated 1-2 m higher than the natural landscape. The results of this landscape modification likely added more prominence to this already large mound, raising it up out of the marshy lowlands and making it visible from Cahokia's Grand Plaza.

The construction of ridge-top mounds in both natural and intentionally modified landscapes suggests that the marshy environs of Cahokia's southern precinct were important to the experience of these mortuary areas. When considering the location and alignment of ridge-tops within Downtown Cahokia, such traits likely emphasize ties to death and the underworld (see discussion of the Pathway of Souls below). As discussed in Chapter 2, the reconfiguration of a naturally wet and marshy landscape for the construction of multiple large earthen mounds indicates a particular intentionality to construction that considered more than aesthetics and functionality. Relationships among Cahokia precinct ridge-top mounds, water, and death are explored later in this section as a central component to the practices of Cahokia's religion. Next, I examine the Rattlesnake Causeway and its importance to constructing the Cahokian built landscape.

The Rattlesnake Causeway

Movements of persons, bodies, items, and earth constitute some of the practices (or 'doings') and relationships entangled with Cahokian mortuary practice and ridge-top mound construction (see Chapters 3, 4). These movements can be traced to households, special-use buildings, and mortuary mounds and are embodied in items like marine shell beads (brought up from the Floridian Gulf Coast of Mexico), unique and non-local pottery vessels and projectile points, bundled bones of deceased persons, the use of specially colored earth in construction projects, and the physical movement of persons (both human and other-than, and dead and alive) along the Rattlesnake Causeway.

Pre-Columbian constructed causeways, like the Rattlesnake Causeway, have been identified in the Southwest, Central America, Mexico, and the Eastern Woodlands (see Darling 2009; Ferguson et al. 2009; Keller 2009; Lepper 2004, 2006; Romain and Burks 2008; Snead et al. 2009; Sofaer 2008; Pauketat 2009). Causeways are often described as built up earthen or stone avenues of various lengths, widths, and styles and were not isolated to a singular time period, nor only present at one site type (e.g., domestic vs. ritual) (Keller 2009: 133-134). They connect places and direct people to various locales and have political, social, religious, ritual, and economic uses and purposes that may not be mutually exclusive. For my purposes here, causeways differ from roads and trails in that they are characterized as monumental raised embankments that typically run on a straight course (see Darling 2009: 64; Ferguson et al. 2009: 24; Keller 2009). Causeways can be constructed out of earth or stone and can set up site alignments, connect two (or more) disparate places, and may serve ceremonial or prosaic functions (see Keller 2009: 134).

Both long and short earthen causeways, at least at Cahokia, have been overlooked. Their roles as crucial constructions key to site layout and use were not always at the forefront of archaeological work (see Pauketat 2013a; see also Dalan et al. 2003; Fowler 1997). By locating and examining causeways, we gain a better image of the Cahokia precinct's infrastructure, one that not only included large earthen monuments dedicated to the living and the ancestors but also a means to move between these spaces both in and through the spiritual or ancestral and earthly realms (see Hall 1997; Pauketat 2013a). The remainder of this section presents the results of my most recent archaeological investigation into the previously uncorroborated Rattlesnake Causeway, beginning first by revisiting previous investigations and histories surrounding this causeway and ending with a discussion of my archaeological data. The importance of this causeway is twofold, 1) its existence emphasizes the significance and alignment of Downtown Cahokia's site organization and layout, and 2) unites Downtown Cahokia with one of the largest ridge-top burials at the site along the 5^{o} east of north grid. Further, this causeway aligns to a diagonal line drawn through a 5^{o} offset square, that comprises the Grand Plaza, which is then aligned to the lunar standstill (see Romain *in press*; Pauketat personal communication; see further explanation below, see Chapter 4).

The possible existence of the Rattlesnake Causeway at Cahokia was first recognized by local farmers who worked the land around Cahokia, followed by Warren K. Moorehead's foundational 1920s archaeological fieldwork and survey in the American Bottom (see Dalan et al. 2003; Fowler 1997; Moorehead 1929 in Kelly, ed. 2000). Since Moorehead's survey the existence of this large, central causeway has been questioned with particular emphasis on whether this ridge was attributable to a modern railroad spur and/or roadway, or was of aboriginal construction (Anderson and Fowler 1966: notes on file Cahokia Mounds State Historic Site; Fowler 1997; Moorehead 1929 in Kelly, ed. 2000; see also Pauketat 2009, 2010). In his 1929 account Moorehead (104-106) commented, "Beyond No. 66 toward the north is an elevation flanked by two ponds or depressions. Old observers used to call this a causeway leading to other mounds". Fowler (1997: 176) followed Moorehead's original comment:

> …separated from the borrow pits on the east by a ridge above the 127 meter (416.7 foot) contour line, which appears to be a causeway extending from just south of Mound 60 and east of Mound 72 southward as far as the Rattlesnake Mound (Mound 66). Some suggest that the causeway was built to cross over this very swampy area to the south of the main Cahokia site.

Anderson and Fowler (1966: notes on file Cahokia Mounds State Historic Site) cite Throop's 1928 notes that "quotes the former property owner as saying there was an aboriginal causeway between Rattlesnake and Fox Mound." Throop (1928: 34) stated: "The surrounding ground is very low, with, however, a well-defined graded way running due north." Figure 5.3 provides an artist recreation of what the causeway may have looked like in relation to Rattlesnake Mound, Mound 72, and the central Grand Plaza.

In 1964 and 1966 the University of Wisconsin, Milwaukee (UWM) conducted test excavations, under the direction of Melvin Fowler and James Anderson, into the hypothesized Rattlesnake Causeway to determine if the modified land was of aboriginal construction or due to a modern railroad spur. Anderson and Fowler (1966: field notes on file Cahokia Mounds State Historic Site) identified an approximately 800 m long and 25-30 m wide low ridge running southwest from east of Fox Mound (Mound 60) to Rattlesnake Mound (Mound 66). The ridge varied in height from a low ½ meter on the northern end to 2 meters in height on the southern end (see Figure 2.6). This discrepancy in height is still visible today and is likely enhanced, on the southern end, by a modern railroad spur constructed between 1880-90. Moorehead (1929 in Kelly ed. 2000: 13) also noted an additional construction of railways by Street Railway lines in

1910/11, but it is unclear which railroad construction directly impacted the Rattlesnake Causeway.

Anderson and Fowler (1966: field notes on file Cahokia Mounds State Historic Site) note the presence of this railroad spur stating "…the ridge was in part a RR spur line…[but] it is reasonable to assume the spur line was built over the existing aboriginal causeway. We have no proof however…". This railroad spur is visible on recent LiDAR imaging as a rounded peak built directly onto the wider, lower aboriginally constructed causeway on the southern end prior to the modern CSX owned railroad tracks that bisects the causeway and the Cahokia Mounds State Historic Site (see Figure 2.6; see Figure 5.2). It appears that the builders of the railroad spur borrowed fill from the eastern and western causeway edges in one section of the feature, compiling the fills into a rounded spur built directly on top of the original embankment. This is visible in the height differential seen between 1) the railroad spur itself and 2) the height of the aboriginal causeway (see Figure 2.6).

In 1964 and 1966 the UWM crew placed trench cuts by hand and by backhoe throughout the causeway in attempts to determine its origins, however no plan map marking the location of the trench cut or hand units was identified in Anderson and Fowler's original notes. Based on written excavation notes, however, Anderson reported identifying a "round wall trench pattern" with "a round fireplace" located near the center of the raised ridge (Anderson and Fowler 1966: field notes on file Cahokia Mounds State Historic Site). Also identified were "continuous ditches on either side [of the ridge]" which Anderson argues were likely sources for causeway fill. They note, "the stratigraphy was confused with no distinct zones present" leading the UWM crew to argue that the ridge was likely due in part to the railroad. Railroad spikes were also present on the surface of the raised ridge 750 m southwest of Monks Mound suggesting at least minimal railroad involvement, although Anderson and Fowler do note that it was "difficult to accept the notion that the ridge was completely modern" (1966: field notes on file Cahokia Mounds State Historic Site). Ultimately Anderson and Fowler (1966) surmised that this causeway was of aboriginal construction stating, "… [it] was assumed to be the central entrance of Cahokia since the ridge ended in this same general area. It was felt that the ridge was a roadway into the central mound group." The results from this excavation were never published with the exception of a mention in Fowler's *Cahokia Atlas:* "A trench through this area suggested that what appeared to be the causeway may have been fill for a railroad spur, but it is also possible that the railroad spur was built on top of an aboriginal causeway" (1997: 36). Anderson and Fowlers 19964, 1966 trench is still visible today on recent LiDAR imaging approximately 750 m southwest of Monks Mound (see Figure 5.2).

The UWM excavation photographs and notes are difficult to interpret and, based on recent conversations with William Iseminger (P.C. 2011) the results of the excavation were never fully agreed upon; there was always some underlying speculation that the causeway could not be 'real' and must be accounted for by modern construction. In Pauketat's recent popular book (2009), the presence and importance of the Rattlesnake Causeway was brought up again, indicating its central location, length and association with Rattlesnake Mound and Cahokia's central precinct. Pauketat's assessment was based in part on aerial photos and GoogleEarth imaging as well as conversations with Dr. Terry Norris (P.C. 2010) who insisted that this visible raised ridge was not an estimated 800 m long railroad addition, but an aboriginal construction. Following this, ISAS reevaluated the LiDAR imaging conducted prior to Pauketat, Norris's, and later my own assessments; the imaging identified the heightened elevations of the likely Rattlesnake Causeway running northeast to southwest from just east of the Twin Mounds (Mounds 59 and 60), east of Mound 72, down to Rattlesnake Mound (Mound 66) at a length of 752 m total, an average width of 22.60 m and a height ranging from ½ m to approximately 1 m

(Baires 2014; Emerson and Farkas 2011; see also Emerson 2013)(Tables 5.1, 5.2; see Figure 2.6, 5.2).

Causeway Excavations

In the summer of 2011 a University of Illinois, Urbana-Champaign (UIUC) archaeological field school under the direction of myself conducted excavations into Warren K. Moorehead's old Rattlesnake Mound excavation trench. Interest in testing the existence of the causeway stemmed from these recent Rattlesnake Mound excavations and the aforementioned conversations between Pauketat, Norris and myself. During the excavations of Rattlesnake Mound, the causeway was visible as a low raised ridge emanating from the center of a small elongated, oval-shaped mound that parallels Rattlesnake Mound's northern face. Both LiDAR and GoogleEarth imaging highlight the causeway in relation to the surrounding landscape but still leave open the question of origin prompting my limited test excavations of the causeway on its southern end (see Figure 5.2).

Excavations into the Rattlesnake Causeway occurred in March 2012 under the auspices of UIUC and the Illinois Historic Preservation Agency (IHPA). The goals of the excavation were threefold: 1) does the causeway exist, 2) if so, how was the causeway constructed, and 3) to determine the chronological affiliation of the causeway.

Today the causeway runs through thick underbrush, is 752 m long, between 22-25 m wide along the base, and ranges in height from ½ m (northern end) to 1.25 m (southern end) at its highest point (see Figure 2.6; see Tables 5.1, 5.2). To ascertain an estimated volume of fill needed to build the causeway, and to predict the person-hours needed to construct this feature, I estimated the causeway volume using height, length and width profiles and distances based on LiDAR imaging and Quick Terrain Modeler software. The average causeway height (of 0.7 m) was estimated from four height profiles taken at 100 m (Pt 1), 300 m (Pt 2), 400 m (Pt 3), and

700 m (Pt 4). Length was estimated at 752 m, with an estimated width of 22.60 m (see Tables 5.1, 5.2 for coordinates and corresponding elevations for each height profile). The ends of the causeway were considered 1) the feature's point of origin (Rattlesnake Mound) and 2) where the visible causeway terminates (southeast of the Twin Mounds) as discerned from LiDAR imaging (see Figure 2.6). Width was calculated by averaging four width measurements obtained from the four aforementioned west to east profiles (see Tables 5.1, 5.2). Based on these length, width and height averages, the total fill volume for the Rattlesnake Causeway is estimated to 11,896 cu m. This estimate is 1,304 cu m smaller than a portion of the estimated "total minimum [Grand] plaza fill volume of 13,200 cu m" (Alt et al. 2010: 142), a roughly contemporaneous construction project marking the beginning of the Lohmann phase (see Chapter 2; see also Dalan et al. 2003; see also Alt et al. 2010). Importantly, the Alt et al. (2010: 142) estimate "covers about one fourth to one third of the Grand Plaza space, and possibly only half of the total plaza thickness within that space" and "is comparable to a modest-sized Mississippian mound at Cahokia." Based on the fill estimate of the causeway, following Alt et al. (2010) and using Muller's (1997) labor estimate for moving earthen fills as one person-day at 1.25 cu m, the labor, in person days, required to build the causeway is estimated at 9,517. This labor estimate, again, is similar to the amount of labor estimated to construct a portion of the Grand Plaza (10, 560 person-days [Alt et al. 2010]).

To obtain west to east profiles of the causeway, the areas targeted for my limited text excavations were located 400 m south of the Twin Mounds (Mounds 59, 60) (Cahokia Grid Point 105, N -600 E 170) (due east of Mound 72) and 200 m south of that point near the modern railroad tracks owned and operated by the railway freight company, CSX (Figure 5.4). Excavation areas were chosen because of their relative elevations (126.72 m asl and 126.99 m asl respectively) compared to the surrounding landscape and because the southern most area of the causeway was previously impacted on the west, east, and south sides by borrowing for the railroad track system that currently cuts through the southern boundary of the Cahokia site.

At the time of excavations the water table was fairly high emphasizing the topographic distinction between the raised causeway and the surrounding lowland. The Rattlesnake Causeway is much lower in height and less visible on the northern end where it culminates east and south of Mounds 59 and 60. The discrepancy in causeway height between the northern and southern ends likely relates to the natural topography of the surrounding lands. The causeway was constructed through a sunken swale immediately west of a low-lying ridge. Viewing elevations of the causeway using Quick Terrain Modeler, the southern causeway section (Cahokia grid coordinates: N: -1247.73 E: 137.44) was constructed through the lowest portion of the natural marshy swale (~125.7 m asl) emphasizing the likely need to build a higher embankment (see Figure 2.6). The northern section of the causeway (N: -1249.36 E: 126.70) ran through an area of slighter higher elevation (~126.0-126.5 m asl) deemphasizing the need for a significantly raised earthen embankment. The causeway itself is at its highest point (126.9 m asl) just north of the modern CSX owned and operated railroad tracks (N: -1247.73 E: 137.44) (taking into account the possible railroad berm addition), which corresponds to the lowest elevation of the surrounding marshy swale. South of the railroad tracks the causeway is visible again as a low-lying embankment extending southwest and culminating at the midpoint of Rattlesnake Mound- at the low platform paralleling the northern mound face.

Prior to excavation the Cahokia grid system was extended to the southern end of the causeway and all excavation units and trench cuts were mapped onto this pre-established grid. Two preliminary test units (TU-A, TU-B) were placed 400 m south of the Twin Mounds (Mounds 59, 60 and Cahokia Grid Point 105) across the causeway and into the adjacent swale. TU-A was dug to a depth of 125.91 m asl before encountering the water table; a 15 cm thick historically disturbed zone was encountered on the surface followed by an A horizon and a yellowish clay subsoil at an elevation of 126.09 m asl (Figure 5.5). The disturbed zone contained historic glass and nails as well as slag. Due to the historic disturbance of TU-A and B and the height of the water table, no indication of pre-Columbian construction was identified. Both units were photographed and mapped prior to moving the excavations south.

Located at Cahokia grid points N: -1249.36 E 126.70 to N -1247.73 E 137.44, an 8.4 m profile cut was excavated into the area of the causeway previously truncated by construction for the Baltimore and Ohio Railroad Company yard (now the CSX Railroad) (see Figure 5.4). The profile cut followed the visible change in ground elevation starting at the low eastern edge of the causeway moving west toward the causeway center. Excavations stopped at 8.4 m at a large intrusive tree resulting in a profile of the eastern half only. The western half was not excavated and remains intact for further investigations. The profile of the eastern half provides a detailed view of the causeway highlighting the construction methods and types of fills used (Figure 5.6, Table 5.3). This portion of the causeway, as previously stated, was truncated by the railroad providing an accessible section for excavation. In a series of 2 m square units disturbed and slumped fill was cut back revealing intact causeway feature fill; each 2 m section was profile mapped at a scale of 1:10 and photographed.

Primarily, the causeway is a compilation of basket-loaded mound-like fill, organic feature-like fill and alternating layers of light and dark anthropogenically modified sediments. Intact subsoil was present at the causeway base and the anthropogenically-modified layers were placed on top of this basal zone (see Figure 5.5, Figure 5.6, Figure 5.7). In profile, the eastern half of the causeway is a flat-topped area about 7 m wide with the last 1.4 m reflecting a sloped edge.

Specifically, the causeway layers consist of modern topsoil (20 cm at its thickest point), a dark layer (zone A), a feature-like fill (zone E), followed by a series of yellow and dark silty loam layers and mottled basket-loaded fills (see Figure 5.6, Table 5.3). The initial (lowest) construction layers are similar to what one would see in preparation for building a mound: very thin (3-5 cm at the thinnest) alternating couplings of yellow and black fills and buckshot fills (mixed yellow, black and brown soils). This preliminary series of layers was likely used to build up the causeway base, creating a structured and sound platform upon which the remaining causeway fill layers were deposited (see Sherwood and Kidder 2011). Following this series of tightly packed zones was a thick 47 cm deposit of dark feature-like fill (zone E) covered over by two mantles of silty clay soils (zones A, B) creating the final flat top of the causeway. This was then capped on the eastern end by two layers of grey clay (zones G, H). These two final fill zones likely maintained the structural integrity of the causeway; zone H was added to the edge of the causeway, sloping down from the flat top at a slight angle covering the edges of fill zones G and I (see Figure 5.6). Important to note, it is *possible* that this edge was prematurely truncated by the railroad and the slopped edge reflects this intrusion, however at the time of excavation the eastern edge was interpreted as reflecting the intact sloped causeway edge.

To ere on the side of caution, it is possible that the 47 cm deposit of dark feature-like fill (zone E) encountered during this most recent excavation was not original to the causeway and could represent the addition of the railroad berm; but, there is currently no evidence to support this hypothesis from this excavation. No historic debris (like the kind uncovered by Anderson and Fowler in their earlier excavations) was identified in any context during the excavation of the southern causeway trench; there was also no evidence of silting, weathering or pedogenic activity between the lower aboriginal construction fills and this upper 47 cm zone of fill, to support the idea that this upper zone was a late addition and hence a railroad intrusion. Based on the lack of readily available historic debris from this southern causeway context I can confidently assess that the 8.4 m southern test trench consisted of intact, aboriginal construction fills. Based on the data gathered from this limited testing, then, it would appear that the height of the causeway is variable, and as stated above, I contend this variability in height is related to the variation in elevation of the natural topography. This hypothesis, however, is just that, a hypothesis and requires more testing to argue conclusively that the causeway was or was not impacted by modern construction.

This is not to say that there is no evidence *at all* of modern additions to this feature and as previously stated a historic railroad berm (or at least the start of one) was likely constructed on top of this southern section of the causeway in the 19th century. An argument can be made for its presence based on the comment made by Warren K. Moorehead in 1929, by the excavations conducted by Anderson and Fowler as well as evidence identified on LiDAR and GoogleEarth imaging. Anderson and Fowler (1966) believed they identified the berm 750 m south of Monks Mound as an addition to the causeway's summit. There is extensive evidence for borrowing along the southern portion of the Rattlesnake Causeway visible both on LiDAR imaging and in person as a deep cut running west to east bisecting the causeway just north of the modern railroad tracks (see Figure 5.2). Soils for the construction of the railroad berm were likely borrowed from the areas along the eastern and western sides of the causeway, as well as from the area bisected by modern railroad tracks. Directly south of where the recent UIUC trench cut was placed is a low man-made slough that runs up to the edge of the causeway as it sits today evidencing this intrusive railroad activity. Importantly, the addition of such a railroad berm was likely intentional as building on top of the causeway would have provided much needed elevation to avoid flooding during the rainy seasons. More testing is required to confidently identify the exact locations impacted by railroad construction to supplement the LiDAR images.

Causeway Artifacts

The feature-like fill of zone E and the interface between the lower layers of alternating yellows and blacks (zones V, J) contained few artifacts: chert flakes, charcoal, and broken bits of shell and limestone tempered pottery (Table 5.4). The presence of 12 small sherds of shell and limestone tempered pottery near the bottom of the causeway (within zone E) suggests an early Mississippian affiliation within the Lohmann phase (AD 1050-1100); limestone tempered pottery is generally not made after the Lohmann phase (see Holley 1989). An AMS ^{14}C date of a charcoal sample collected from the interface between zones V and J, revealed an uncalibrated date of 900 ± 20 (Sample ID- A2427; $\delta^{13}C$ = -24.9‰)[2] (Table 5.5). For the date 900 ± 20 two possible calibrated age ranges include 1043-1104 cal A.D. (p=0.5) and 1118-1209 cal A.D. (p=0.5) (calibrated at 2s using the program CALIB 6.0 [Stuiver and Reimer 1993]). This date indicates that the causeway was constructed at the onset of Cahokia's "Big Bang" (circa A.D. 1050) (Pauketat 2004) highlighting its importance as a central fixture of the site, one that set up Cahokia's 5^{o} east of north grid system and overall organization of city space. Important to note is that this early date corresponds nicely with the early activity of Mound 72, which the causeway passes directly east of (see Fowler et al. 1999). The causeway also connects Rattlesnake Mound with Cahokia's central precinct indicating that Rattlesnake Mound was likely an early addition to the Cahokia site as well (see below).

The paucity of artifacts (see Table 5.4) present in the causeway construction fill layers and identified at the interfaces of zones within the feature-like fill of zone E suggests that these small pieces of pottery and chert were accidental inclusions in the feature fill; minimally this indicates that early Cahokian's (and their limestone/shell tempered pottery) populated the American Bottom either prior to or during the initial construction of the causeway feature.

[2] Hong Wang, University of Illinois Urbana-Champaign, conducted AMS 14C dates at the Illinois State Geological Survey (ISGS).

Additionally, artifacts found intermixed within only the fill from zone E indicate that most of the sediments used for construction were specially screened and mixed to create buckshot fills, clean yellow silty clays and dark black clays. This characteristic of purifying construction fills is context dependent, but is exemplified elsewhere at the site of Cahokia. In these contexts artifacts are minimally recovered from intact mound construction fills (see Sherwood and Kidder 2011; see also Fowler et al. 1999). In the context of zone E it is likely that the artifacts recovered were unintentionally included within fills likely borrowed from former residential areas; the presence of limestone and shell tempered jar body sherds supports at least a minimal age dating to the early Lohmann phase (ca. AD 1050), which corresponds with the radiocarbon assay acquired from the interface between zones V and J. Of course, more excavations need to take place to confirm this chronological sequence and to confidently place the construction of the entire causeway within the Lohmann phase.

Important to the discussion of the causeway is its unique orientation: one that highlights Cahokia's 5^{o} offset grid. Using a compilation of LiDAR and GoogleEarth imaging along with total station data the causeway has been incorporated into the Cahokia grid system and overall site map (see Figure 2.5). When this new site map is superimposed by Reed, Bennett, and Porter's (1968) principal axis connecting Rattlesnake Mound, Mound 72, the edge of Fox Mound, the centerline of Monks Mound, and Mound 7 in the Kunnemann Mound group (aligned to 5^{o} east of cardinal North) it is clear that the causeway was intentionally constructed to mark and cite this specific orientation. Combined with the date range of 1043-1104 cal. A.D., the argument for the approximately 752 m long and 25 m wide causeway to be a foundational feature of Cahokia's emergence becomes much more concrete.

Rattlesnake Mound

Rattlesnake Mound (also known as Mound 66 or Harding Mound) was recorded as early as 1882, excavated twice in the early 1920s by Warren K. Moorehead and surveyed by Addison Throop in 1928 (Fowler 1997). Originally, the name 'Rattlesnake' was used to refer to a smaller ridge-top, Mound 64, located northeast of Mound 66 (Rattlesnake Mound). Mound 64 was partially covered over by construction for the then Baltimore and Ohio Company railroad tracks (now owned and operated by CSX Railroad) that ran through the southern portion of the Cahokia site. According to Fowler (1997: 133) the name Rattlesnake, was accidentally transferred to Mound 66 by USGS surveyors, initially causing some confusion in identifying the location of the mound. Throop (1928: 38) recounts that the name 'Rattlesnake' was originally given to Mound 66 by pioneers "because of the great numbers of rattlesnakes found on it". Today, Rattlesnake Mound sits among overgrown brush and can be seen as a long ridge rising up out of the overgrowth. It is estimated to be between 9 and 6 meters in height, approximately 51 m north south and 132 m east west (Fowler 1997: 133) (see Figure 2.5). It is one of the largest mounds at Cahokia and sits along the sites hypothesized southern boundary in a low-lying marshy area flanked on the east by a ridge.

Throop (1928: 38-39) described Rattlesnake Mound as "beautifully rounded [with] less than one-tenth of a foot difference in elevation" across the summit. When Taylor originally surveyed the mound (in 1927) he "was amazed at the accuracy of contour maintained by the builders, and expressed himself as puzzled that so great a pile of earth could be made to keep so nearly true its contour throughout the ages" (Throop 1928: 38). Throop also remarked that the surrounding ground was very low with "a well-defined graded way running due north" from the center of the mound up towards "old Cahokia" or Monks Mound (1928: 38-39).

Due to the concern that the Baltimore and Ohio Railroad Company tracks that cut through Mound 64 would soon be expanded south, destroying Rattlesnake Mound, Moorehead focused the intensity of his salvage work on the testing of Mound 66. In 1922, Moorehead conducted preliminary excavations of Rattlesnake Mound by digging several test pits and auger cores concluding that the mound was stratified but contained "little village site debris" (1923: 35, see also Pauketat and Barker 2000: 126). In 1927 the mound was the target of full-scale archaeological excavation by W.K. Moorehead's team supervised by the primary archaeologist, J.L.B. Taylor. Taylor and his crew implemented an arbitrary grid system aligned to the center of the mound, and began fieldwork with a topographic survey. Following this topographic survey, Taylor and his team placed 231 auger holes at 1.5-4.5 m intervals throughout the mound to obtain an adequate east west profile. Taylor then attempted to put in an excavation trench of 60 m in length on the north south minor axis culminating at the mound's summit in a 40 m wide trench. Originally, Taylor allowed for a 1-1 slope but due to the placement of the office tent in the center summit of the mound this plan was abandoned (Moorehead 1929:74) (Figure 5.8). Instead Taylor decided to shift the trench 15 to 20 feet to the west, which

> culminated in a steep vertical face cut into this southern side [of the mound], and then was continued in two sections on the summit, east and west of the mound's center. The lesser of these two trench sections was excavated to a depth of less than 1.5 m east of the mound's center. The western summit trench was excavated to a depth of 4.25 m (Pauketat and Barker 2000:126).

Trench excavations and auger tests revealed a series of layers of 'gumbo' clay, a bluish-black, extremely sticky clay soil found in the southern portion of the Cahokia site underneath the plow zone (Fowler 1997: 133-135). Taylor reported a series of yellow and black thin soil layers and yellow and black 'buckshot' fills compiling the Rattlesnake Mound profile. These soil layers were corroborated with further auger core tests conducted throughout the mound on both the major and minor axes. Taylor (Moorehead 1929: 77) remarks on the mounds stratigraphy:

> At slightly below twenty feet it had changed to about equal parts of black and yellow, then a thin darker stratum appeared, and under this again, just above twenty-four feet, was dry black and yellow. Here a six-inch stratum of a distinctly reddish mixture intervened, after which, slightly past twenty-five feet, the dry black and yellow prevailed. The next two feet showed moderately dry black gumbo, then came about two and one-half feet of moist black gumbo, another two feet of black muck, and finally yellow gumbo to the bottom of the hole at about thirty-three feet.

Few artifacts were recovered from Taylor's excavations and mainly consisted of small sherds of pottery, lithic materials, fresh water shell, and charcoal bits. Limited contextual information for these artifacts is available and Taylor remarked that these materials were often acquired from within stratigraphic mound layers and not feature contexts suggesting that these materials were accidental inclusions mixed into the sediments upon collection from the original source (Moorehead 1929: 78). Taylor did identify what he referred to as "camp refuse" at about 29 feet (or 8.8 m) below the surface of the mound summit determining that there was at least "a slight stratum of camp refuse at or probably below the base of the mound at this point" (Moorehead 1929: 78). This suggests that prior to the construction of the mound there was likely an earlier habitation area.

On May 18, 1927 Taylor and his team uncovered a series of bundled human remains at about 3 feet (or 0.9 m) below the ground surface along the southern mound face (Moorehead 1929: 71). Taylor remarked that the remains uncovered were badly decomposed and "all were so firmly bonded in the gumbo that none could be preserved for measurement" (Moorehead 1929: 71). Subsequently, the team uncovered a series of three human skulls bundled together with "heavier limb bones" along with a "red sienitic granite discoidal, three inches in diameter and one inch thick" laid on the mandible of one of the skulls (Moorehead 1929: 72). Few other artifacts were identified with these discovered remains and consist of pottery sherds and lithic debitage, likely unintentional inclusions. The following day, Taylor uncovered an “almost continuous bed of human skulls, humeri, ulnae, radii, femora, tibiae, and fibulae” (Moorehead 1929: 72). These elements were laid out and deposited in bundles and consisted of approximately 6 skulls and corresponding limb bones with teeth intermixed within the remains. The orientation of the bundles “lay parallel with the minor axis [north south] of the mound, although a few bundles were found lying almost at right angles to this” (Moorehead 1929: 73). At the end of their excavation, Taylor counted at least 150 burials. Within this complex of human remains Taylor identified a “circular, disc-like formation of orange-yellow earth, of somewhat denser texture than the surrounding soil, and was one foot thick and five feet in diameter”(Moorehead 1929: 72). Although Taylor did not identify it as such, this feature was a hearth located in the center of an un-identified wall-trench building constructed prior to the interment of the 150 burials (Pauketat and Barker 2000: 139).

Following the identification of the burials, Taylor and his team tested the areas east and west of rectangular burial area and determined that no additional human remains were interred along the mound’s southern face. Taylor excavated and discarded the human remains, mapped the mound profile walls and floors, and left. He sent “the crowns of about two hundred teeth” from the burials to Dr. Henry W. Gillett in New York (Moorehead 1929:74). He also collected a series of skulls “in gumbo blocks” sent to the Anthropology department at the University of Illinois (Moorehead 1929: 73). As of today, one skull left in the original clay matrix and a series of teeth from Taylor’s original excavations were relocated in the Anthropology Department, UIUC.

Taylor’s impressions of the mound were limited; his goals included determining the mound’s origins and acquiring a sample of data prior to the impending destruction of the mound by the Baltimore and Ohio Railroad Company. Luckily, the Baltimore and Ohio Railroad Company never expanded their tracks, preserving Rattlesnake Mound in its entirety. Taylor and Moorehead's conclusions state that this mound was in fact a tumulus but was a "mystery" as they determined it was constructed between "limited dates" as opposed to over a long span of time. In particular, Moorehead concludes that the rapid construction of Mound 66 was proved by the absence of "sod lines", or naturally occurring soils present between mound construction episodes (Moorehead 1929: 104-106). In regards to the burials, Moorehead concluded that they must have been added after the construction of the mound because no other remains "alters, or distinct stratigraphy in the body of the mound" was present to suggest the inclusion of human remains throughout the monument (Moorehead 1929: 104-106). They further determined that this mound was not for dwelling but instead a place of burial connected to the larger Cahokia site by "an elevation flanked by two ponds or depressions": the Rattlesnake Causeway (see Baires 2014; Fowler 1997: 137). Overall, both Taylor and Moorehead agreed that this mound was 1) of aboriginal construction and 2) a burial mound.

Mound Excavations

Between 15 June and 15 July, 2011, the University of Illinois, Department of Anthropology conducted a targeted archaeological excavation into the previously excavated 1927 Warren King (W.K.) Moorehead and J.L.B. Taylor trench cut located on the southern slope of Rattlesnake Mound. I directed the excavations along with Timothy R. Pauketat and Melissa R. Baltus who helped supervise the project and the ten UIUC field school students (Kyle Olsen, Laura Lemermeier, David Kabak, Leslie Drane, Erik Pugesek, Mechell Fraizer, Sarah Scattergood, Sarah Woolley, Matthew Fort, Kyle Williams). These excavations were conducted under a Human Skeletal Remains Protection Act (HSRPA) and Archaeological and Paleontological Resource Protection Act permit (#2010-062). The Cahokia Mounds State Historic Site granted access to the mound with additional permissions granted by the CSX railroad company who currently owns the access road that separates the southern and main portions of the Cahokia site.

Due to a lack of information stemming from Moorehead and Taylor's original work, which was to solely identify whether or not the mound was of Native American construction or a natural landmass, the purpose of the UIUC excavation was to gather much needed construction method details (including types of sediments used for construction), chronological affiliation, as well as to identify and test the existence of a possible rectangular structure located beneath the estimated 31 sets of pile burials previously removed by J.L.B Taylor in 1927.

Preliminary fieldwork began a year prior to the excavations of June and July 2011 and consisted of survey and soil probing (using a hand held Oakfield soil probe) to determine the extent and depth of the re-deposited sediments (due to erosion, weather, and general degradation of the mound) present in the Moorehead and Taylor's original 1927 trench cut, which was left open to fill in for 86 years. The trench, today, is visible as a deep cut oriented north to south and located slightly west of mound summit center. During this initial survey the original boundaries of the 1927 trench cut were determined using J.L.B. Taylor's original maps (plan view of the excavation and contour map of the mound marking the location of the trench cut) (Figure 5.8). Once identified, the trench walls were marked on the eastern side of the original trench cut with wooden stakes placed at 2 m intervals setting up the arbitrary mapping grid and excavation units. Using Taylor's plan and contour maps as references, the datum (point 1: located on the summit of the mound at an arbitrary northing and easting of N 100 E 100, 100 m asl) was used as the basis for setting up the series of 2 m x 2 m and 2 m x 1 m excavation units, for re- locating the area of previously removed human remains and the likely associated structure.

After this initial survey both the original trench cut and a large area (approximately 10 m x 5 m) at the base of the mound on the south side were exposed for excavation. Two problems were encountered when setting up the grid system: 1) a GPS location with a handheld Trimble GPS was not obtained due to tree growth and the density of the foliage, and 2) the extension of the pre-established Cahokia mapping grid was not possible through the low-lying swampy area, railroad tracks (and trains located on the tracks) and the railroad access road that divides Rattlesnake Mound from the rest of the Cahokia Mounds State Historic Site. So, an arbitrary grid was established using the center point of the trench (point 1) as the centerline of the grid system, which was assigned an arbitrary Northing and Easting of N 100 E 100 and an elevation of 100 m asl.

Two stepped trenches were set up through Moorehead and Taylor's initial mound cut; one oriented west to east through the central portion of the mound summit and the second oriented north to south along the southern mound face culminating at ground level. Both trenches included eight units designated A, B, C, D (west to east trench) and F, K, J, I (north to south trench). Five additional discontinuous units were placed throughout the trench and consisted of unit O (1 m x 2 m) located north of the north to south stepped trench, unit G (2 m x 2 m) located 1 m west of unit I, unit M (1 m x 2 m) located 3 m south of unit G, unit H (2 m x 2 m) attached to unit F, and unit L (2 m x 4 m) located 17 m south of unit I (Figure 5.9, Figure 5.10).

Units O and G were specifically excavated to identify the western limits of the original mound trench and to identify a change, if any, in mound construction technique between the lower and upper portions of the mound (i.e. soil layering, types of soils used). Additionally, unit L was placed off mound along the southern face to test for the presence of other surrounding features (pits, buildings, middens, etc.). This area yielded no additional features, but did uncover an area of mixed prehistoric and historic materials likely a result of Moorehead and Taylor's 1927 excavations. Additionally an area 10 m x 5 m, located between unit L and unit I (designated the 'southern unit') was excavated to re-locate the mortuary area identified during Taylor's 1927 excavation.

Upon removal of the re-deposited sediments, intact mound fill was encountered 10 cm below modern topsoil in the west to east trench and 35 cm below modern topsoil in the north to south trench (Figures 5.11, 5.12). One of the goals of the excavation was to dig through enough mound fill to hit sterile soil, or an otherwise preliminary village or stage surface used prior to the construction of the mound itself; however, we were unable to dig deep enough through the re-deposited fill to encounter that surface. The final mound unit (unit I, last unit on the north-south trench) hit the water table at approximately 1.22 m (96.59 m asl) below the modern soil surface of the trench cut. But based on the location and the depth of this unit, and the elevation of feature 1 (wall trench structure located on the south side of the mound 95.61 m asl), trench excavations were halted approximately 1 m above the base of the mound and the original ground surface where feature 1 was constructed.

Of particular interest to this excavation were identifying the methods of mound construction, which mainly consisted of tightly packed alternating layers of light and dark sediments (Tables 5.6, 5.7). The methods used to construct Rattlesnake Mound were similar to the documented construction methods and techniques used at Powell Mound, Mound 72, Red Mound, and Monks Mound for example (see Chapter 4). The main methods of construction employed included basket loading, zoned fills (single sediment dumping events amassed to construct one larger fill event), and layered zones of sediments (see for examples Pauketat 1993; Pauketat et al. 1994; Sullivan and Pauketat 2007; Sherwood and Kidder 2011: 78). These stages usually consist of alternating color sequences, and in the case of Rattlesnake Mound, were mainly composed of yellow silty clay, black gumbo clay, and a mottled buckshot fill (mixed yellow, black, and brown sediments). These alternating layers of colored fills are also present as zoned fills (or blanket mantles) (see Knight 1995, 2010; Pauketat 1993, 2000, 2004, 2008), which refer to the "application of homogenous layers placed horizontally alternating from permeable to less permeable layers and back" (Sherwood and Kidder 2011: 78). According to Sherwood and Kidder (2011) zoned fills were likely utilized to affect moisture balance and to protect against erosion. At Rattlesnake this is evidenced in the application of layers of yellow silty clays on top of/alternating with layers of black gumbo clays. For comparison, this practice of alternating fills was utilized in the construction of Monks Mound where black organically enriched clays alternate with yellow/light brown coarse-grained silts, the argument being this alternation of fills stabilized the mound (see Sherwood and Kidder 2011: 80, Figure 14).

Rattlesnake Mound was likely constructed in 5 sequential events (based on the combined data from both profiles- west to east, north to south): 1) initial construction episode composed of alternating colored layers of zoned fills between 4-10 cm in thickness, 2) packed basket loaded fills between 5-10 cm in thickness, 3) an additional construction event of zoned fills between 3-15 cm in thickness, 4) packed basket loaded fills 4-10 cm in thickness, and 5) a final stage of alternating colored zoned fills (3-10 cm in thickness). The mound's ridge-top cap was removed, in this area, with Moorehead and Taylor's original excavation. The upper most portion of intact mound consisted mainly of basket loads and zoned fills (or blanket mantles) (see Knight 1995, 2010; Pauketat 1993, 2000, 2004, 2008). Additionally, small zones of what appear to be rounded clay balls (10YR 5/4) were added between layers of basket loads/zoned fills, or were included within zones of darker sediments.

In the west to east trench cut (units A, B, C, D), unit A consisted of 8 alternating colored zoned fills, while unit B consisted of 20 alternating zones, for example (Figure 5.11). Mound fill (zone BB) in unit A was first identifiable at 101.46 m asl, approximately 5 cm below modern topsoil. Mound fill in unit B was encountered approximately 24 cm below modern topsoil at 100.8 m asl. Zones in units A and B consisted of tightly packed, alternating light and dark colored sediments of silty clay and clay. Zone BB (in unit A) consisted of 10YR 4/1 silty clay with few medium mottles of 10YR 5/2; this was juxtaposed with the following zone CC of 10YR 3/1 clay with many fine mottles of 10YR 3/2 silty clay. Unit B (view to west) provided the best example of mound construction fills and sequences (along with unit I in the north-south trench): at least 30 alternating zones of light and dark colored sediments packed tightly together. Most of the fills were silty clays and clays with fine to medium mottles of additional silty clays packed in with the darker surrounding sediments (see Table 5.6 for soil descriptions). Zone OOO consisted of a ball of 10YR 5/3 clay (brown/yellowish brown in color) packed tightly between two basket-loaded fill zones. For the majority of the fills, no other inclusions were identified with the exception of a few very small flecks of hematite in zone SSS (in unit B, profile view to west).

Unit C and the upper 40 cm of unit D showed evidence of Moorehead and Taylor's previous excavation trench as a sharp vertical cut abutting the construction fills in unit B. This fill consisted of relatively homogenous re-deposited soils accumulated over the course of 86 years after the trench was left open to the elements. Mound fills in units C and D were almost identical to the fills present in units A and B and consisted of either tightly packed basket loads of light and dark sediments placed one on top of the other, as thin lines or mantles of sediments like zones I2, VVVV and UUUU present in unit D, or as zones that appeared to be tramped or pounded down to form tightly packed sediment layers like zones BB, CC, DD, EE, FF, GG, and HH (in unit A) (Figure 5.11). Construction fills in unit D were encountered at 99.92 m asl and mainly consisted of basket loads of colored and prepared fills. Profile views to the west and to the south, from unit D, contained light colored fill zones (e.g. zone F 10YR 5/4 clay with many fine mottles of 10YR 3/2 clay) with few fine/medium redox features, possibly indicative of a shared soil source for these small balls of yellow/brown clay. No artifacts were identified in or between any of these fill layers indicating that the sediments were carefully selected and cleaned of materials prior to being used for construction. No features or prepared surfaces (wall trenches, pits, or hearths) were identified in any of the units from the west to east profile cut.

The north to south trench (units F, K, J, I) and specifically units F and K consisted of 6 zones of basket loads of lighter brown/yellow silty clays (10 YR 4/3, 4/2) with few fine to medium mottles of darker silty clays (10 YR 3/2, 3/1); these zones alternated with zones of darker homogenous silty clays (10YR 3/2, 2/1) (see Tables 5.6 5.7 and Figures 5.11). The fills in units F and K are much less intricately constructed than the previously described units in the west to east trench and it is likely that these units represent a combination of re-deposited soils from Moorehead and Taylor's original excavations and mound fill. Unit F mainly consisted of re-deposited sediments; possible re-deposited mound fill was uncovered at an elevation of 98.49 m asl and the unit was stepped down to unit K where at an elevation of 98.33 m asl intact mound fill was encountered. Unit K in profile (view to north) consists of basket loads and layers of fills that alternate between very dark greyish browns (10YR 3/2) to dark yellowish browns (10YR 4/3). These zones vary in thickness from 15 cm (zone H) to 2 cm (zone B).

The lower units within the north to south trench (units J and I) revert back to the zoned fills composed of alternating layers of lighter silty clays and darker silty clays (Zone X: 10YR 4/2 silty clay with few large mottles of 10YR 3/1 silty clay; Zone IX: 10 YR 3/1 silty clay). These lower units represent the initial construction phase of the mound, where alternating layers of clays and silty clays were used to create a stable base prior to the addition of the remaining upper and middle mound portions. Again, these lower fill zones (IX-XXV) were composed of thin layers laid down in a relatively parallel orientation, one directly on top of the other (Figure 5.12). Unit I revealed the most detailed construction fill zones with at least 11 alternating colored layers first identified at an elevation of 97.06 m asl. Unit J (profile view to N, 97.74 m asl) also revealed the same pattern of construction, thin (5 cm) alternating colored layers of sediments (zone D 10YR 5/3 clay with many fine mottles of 10YR 4/1 clay and some iron staining; zone F 10YR 3/1 silty clay with fine to medium mottles of 10YR 4/3 clay). Unit I encountered the water table at an elevation of 96.59 m asl inhibiting our ability to dig any further and to record any details of the foundational mound construction layers; however, based on excavation details from the wall trench structure identified along the southern face of Rattlesnake mound, unit I excavations halted approximately 1 m above the original ground surface. Approximately 1 m of fill was removed prior to uncovering feature 1 (wall trench structure), which according to Moorehead and Taylor's excavations was located south of the ridge-top mound base and approximately 3 ft (0.9 m) below the modern ground surface (Moorehead 1929: 71).

This area was excavated to re-locate feature 1, which was associated with the 31 sets of piled human remains (approximately 150 individuals) previously removed by Taylor during his excavations in 1927 (Figure 5.13). Taylor's original plan map identified the area of bundle burials (interred on top of feature 1) between 19-21 m from the trench summit. Once the area was identified a space of 10 m x 5 m was targeted for excavation. The entire section was shovel scraped to remove 1 m of historic overburden, disturbed sediments and re-deposited mound fill. This re-deposited fill (including mixed deposits from Taylor's excavations) contained both historic and prehistoric artifacts as well as small pieces (<1 g) of calcined bone. Once through this re-deposited fill, a small portion of remnant structure basin fill (depth between 5-10 cm from west to east along the profile) was identified at an elevation of 95.61 m asl in the northwest section of the building. The re-set center post (PM1, PM2) was identified at an elevation of 95.45 m asl, approximately 20 cm below the top of the remnant basin fill. At this point the northern wall trench (WT A) was identified at an elevation of 95.21 m asl and the max depth of the post molds were 45 cm deep. The western wall trench (WT D, 95.69 m asl, post mold depth 43 cm) was located next and the eastern (WT B, 95.23 m asl, post mold depth 52 cm) and southern wall trenches (WT C, 93.29 m asl, post mold depth 43 cm) were located last. Overall the wall trench building was 6.6 m x 4.3 m in size, was constructed once and contained a re-set center post and a central hearth.

The structure was difficult to identify at first, due to the intensely disturbed and re-deposited fills located in this area. The discrepancy in elevations between WT A, B, D and WT C is likely due to Taylor's methods of excavation and to the slope of the original ground surface. Originally, it was thought that WT C (the southern wall trench) was completely removed by Taylor as this wall was only identified once an additional 1.92 m of accumulated overburden (mixed historic and re-deposited mound fill) was removed. It also appears that Taylor and his crew deposited the majority of the fill from the mound excavation and the removal of the bundled human remains in the area of WT C and Unit L. It is also very likely that during the excavation of the human remains, Taylor additionally removed the upper fills of the structure without realizing the context. Taylor even identified a hearth feature in the center of the bundled human remains (between burials 9-13 and 9-9), but did not document its size or depth in relation to the surrounding burials (see Figure 5.8). During these most recent excavations burned earth and small (<1 g) amounts of charcoal were encountered within the boundaries of the wall trench structure intermixed with historic debris, indicating that the fill from the hearth had been disturbed.

Due to the nature of Taylor's previous investigations only the wall trenches, a central re-set center post, and a small area of basin fill remained of feature 1 (see Figure 5.13). The contextual data from the excavation and from Taylor's original notes support the conclusion that this structure was constructed, used, and decommissioned prior to the placement of 31 sets of piled burials, which were interred on top of the building in an area approximately 7 m x 6 m- roughly the size of the structure itself (6.6 m x 4.3 m) (see Figure 5.13). The orientation of the building is approximately 112^{o} of azimuth (using magnetic north established with a Brunton compass, adjusted for true north [1.15^{o} West, for June 2011]). This orientation does not align with the orientation of Rattlesnake Mound's short axis (north to south), which is exactly 5^{o} east of north, the same orientation as Cahokia's central line established with Cahokia's emergence and marked by the Rattlesnake Causeway. The orientation of feature 1 is based on the centerline axis orientation of WT A and is eight degrees shy of the orientation of 120^{o} of azimuth- the summer solstice sunset and the winter solstice sunrise (Pauketat 2013a: 145). This orientation (as well as the building's size) indicates that this building (and the overlying burials) were likely a late addition to the mound (see below).

The size of the Rattlesnake structure (6.6 m x 4.3 m) suggests a Late Stirling affiliation when compared to average building sizes (6.35 m x 3.5 m) from the ICT II Tract excavations (see Collins 1990: Table 5.86). Late Stirling to early Moorehead phase buildings at Tract 15A (Downtown Cahokia) also have similar building dimensions with the average rectangular structure measuring 8.3 m x 5.6 m; slightly larger than the Rattlesnake structure (Pauketat 1998: Table 6.11). The orientation and size indicate that this building was a likely late addition to Rattlesnake Mound, one that corresponds to the later reorientation of buildings and neighborhoods that occur in the Stirling-Late Stirling phase at Cahokia (see Collins 1990, Mehrer and Collins 1995; Pauketat 2013a). Possibly, this structure was built with the purpose of re-aligning Rattlesnake Mound to a new established orientation; the orientation of 120^{o} of azimuth is not an unusual alignment and is seen at Mound 72, the Mitchell Site, and at the Vaughn

Branch Site (Pauketat 2013a). Specifically, "the solstitial orientation of Mound 72 holds best for its early pre-mound burials and for the *final configuration of the completed mound*" (Pauketat 2013a: 143, emphasis added). If this is true, then it is also possible that this late added wall trench building located at the base and south side of Rattlesnake Mound served the same purpose: to reconfigure the orientation of the completed mound.

An alternate hypothesis is that this structure was coterminous with the construction of Rattlesnake Mound and follows the same sequence of events as seen at other ridge-top monuments: the construction of a foundational building, followed by the burial of multiple individuals, and subsequently covered over with a low mantle of earth prior to the construction of the burial mound. The archaeological evidence, however, does not readily support this scenario as the size, angle, and context of the building all suggest a later addition (Stirling/Late Stirling phase). Based on the available data I conclude that this structure was a late addition, coterminous with a possible Cahokia precinct-wide re-design during the Stirling-Late Stirling phase.

During the re-excavation of the Rattlesnake Mound trench, no artifacts or datable material were recovered from any of the mound construction fills. This obviously presents a problem when attempting to date the episodes of mound construction and use, but the presence of Rattlesnake Mound as it is oriented to Cahokia's 5^{o} offset grid and its direct relationship to the Rattlesnake Causeway (which dates to the Lohmann phase) indicates that Rattlesnake Mound was likely constructed early in the Cahokia sequence, concomitant with ridge-top mound practices at Mound 72, Wilson Mound and Mound 49. This chronological affiliation is further supported by Romain's (*in press*) hypothesis that Rattlesnake Mound is the point of origin for the Rattlesnake Causeway and the Cahokia grid.

Data supporting the rapid construction of Rattlesnake Mound is based on in-field analysis and further analysis of photographs and profile maps; there is no evidence of intact soil horizonation visible in the construction sequence of Rattlesnake Mound. Rattlesnake Mound was constructed rapidly; there were no identifiable silting episodes or pedogenisis between fill zones in this section of the mound profile, nor any intact surfaces or related activities (e.g. building construction, hearth use, or intrusive pit features). It is likely that Rattlesnake Mound was constructed in one event (at least in this central portion) as opposed to over a protracted period of time (see Sherwood and Kidder 2011 for examples; see also Kidder 2010). This hypothesis is further supported by evidence from other similar mound constructions at Cahokia (see Chapter 3 in particular Powell Mound and The Big Mound); these monuments were typically constructed in at least two massive episodes: an initial platform mound followed by the ridge-top cap. In the context of Powell Mound this method of construction is visible in profile and designated by a dark humus line formed on top of the foundational platform mound (see Ahler and DePuydt 1987).

Mound 72 also shows a similar construction method and sequence, although it consists of three submounds constituting a central core mound, which are then covered over by the ridge-top cap Fowler (et al. 1999: 17, 23) describes the construction of these submounds as consisting of layered basket-loaded fills (primarily composed of materials borrowed from the surrounding natural sediment ["blue/black sticky clay"]) subsequently covered over with a sandy clay mixture creating a veneer "prepared specifically for the purpose of sealing and stabilizing the mound surface". Each sub-mound was constructed rapidly and consisted of locally sourced clays, silty clays, and sands (Fowler et al. 1999: 23-32).

Additionally, Monks Mound (Cahokia's central mound and its largest) was presumably constructed in a series of smaller successive platform monuments. To reach its full potential of approximately 30 meters in height with a base covering 5.5 hectares it is estimated to have taken at least 100 years (see Demel and Hall 1998: 209; Schilling 2010) and a minimum of six sub-mound stages to construct (Schilling 2010); however, each sub-mound was built fairly rapidly employing the same methods of construction as described for Mound 72, Rattlesnake Mound, Powell Mound, Mound 31 and Kunnemann Mound for example (see Emerson et al. 2008; Fowler et al. 1999; Sullivan and Pauketat 2007). Sediments were gathered from the surrounding area and consisted of clayey fills (black gumbo), silty clays, and sands to construct viable core mounds that consisted of alternating colored fills, buttresses and veneers to support the addition of buildings to the summit and to withstand erosion over time (see Sherwood and Kidder 2011).

The intricate construction of Monks Mound is elaborated upon elsewhere (see Schilling 2010) so I will not continue here; instead I want to focus on the use of black gumbo clays in the construction of Cahokian mounds, including Rattlesnake, as sourced from the surrounding American Bottom lowlands. Obtaining black clays from these low-lying swales has been hypothesized by others as a physical manifestation and re-telling of a Native American creation story correlated to contemporary Plains mythologies (see Demel and Hall 1998; Hall 1997; Kidder et al. 2009; Knight 2006; Reed 2009; Schilling 2010: 43; see also Grimley et al. 2007 for a discussion of American Bottom natural stratigraphy). Hall (1997) in particular suggests that the construction of earthen mounds was an instantiation of this origin story, which describes the building of the world by pulling up black, mucky clays from the watery underworld and piling them on top of a turtle back. The use of black clayey soils in the construction of earthen monuments, Hall (1997) argues, is a physical manifestation of this myth-history literally building the world (and Cahokia) out of the watery underworld. But, instead of following the argument that one (mound) follows the other (myth), the construction of these massive earthen structures more likely constitute the doings and practices of such oral histories; in those moments of construction such histories were not histories at all but experiences alive and well, re-imagined in those particular instances of moving earth and persons.

These instances (or doings) are visible in the profile cut of Rattlesnake Mound, which showcased a series of construction methods that included basket-loaded layers of buckshot fills, zoned fills (juxtaposition of light and dark layers), and soil blocks (intact clays removed 'in mass' from the original context) (see Sherwood and Kidder 2011 for fill descriptions). The use of intact clay soil blocks to build up Rattlesnake Mound not only provided a solid, stable construction material but also presenced the underworld in the building of this massive mortuary mound. Rattlesnake Mound as intentionally constructed in a low, marshy area (see Figure 2.6, 5.2; see also Chapter 2). This is important when thinking about 1) Rattlesnake Mound as a place of death and burial, 2) the location of Rattlesnake Mound and, 3) the construction of the mound as an instantiation of creation history(ies).

Further, the location of Rattlesnake Mound and of the Rattlesnake Causeway in a low marshy swale at the southern end of the known edges of the Cahokia precinct suggests a connection between the mound and causeway and the path of the souls of the dead. The Path of Souls "is a common core of belief across the Eastern Woodlands and Plains…[and an] understanding of the Milky Way as the path on which the souls of the deceased must walk" to arrive in the underworld is shared cross-culturally (Lankford 2007: 175). The Path of Souls begins as an east to west trek to take the 'free-soul' to the realm of the dead located in the south. Importantly, the path begins in the direction of the setting sun, toward the west, but changes directions shifting the traveler south to the "edge of the earth-disk, the landmass which floats upon the water" (Lankford 2007: 176). This change in orientation from east-west to north-south marks a change from a life orientation to a death orientation; this shift also orients the soul traveler to the portion of the path (the Milky Way) that contains the portal to the underworld, which is located along a north-south axis and marks the shifting of the Milky Way in the night sky (Lankford 2007: 177-178, 205).

I see a parallel in this description of the locations and movement of the dead to the orientation and location of Rattlesnake Mound and the causeway. Similar to Romain's theory that the causeway was constructed to mirror a lunar standstill and thus tie together the tri-partite 'division' of the world, I would also argue that the causeway and Rattlesnake Mound were constructed to cite a possible Path of Souls (which is oriented slightly east of north), directing the dead along the Rattlesnake Causeway, through the marshy, watery realm (or the stream the free soul must cross to get to the Realm of the Dead), to the edge of the earth-disk (Rattlesnake Mound) and ultimately to the Realm of the Dead. Lankford (2007: 205, Figure 8.11, emphasis original) states, "The portion of the Milky way that contains the portal in the west- the Hand- swings toward the north in the sky, so that the leg of the journey actually *on* the Path is no longer oriented east and west, but north and south." Romain's hypothesis (see Chapter 4) and my hypothesis are not mutually exclusive and suggest that Cahokian's intentionally united multiple realms through their earthly constructions of mounds and causeway. This unity is also seen, as previously mentioned, in the motifs of Ramey incised vessels (Pauketat and Emerson 1991) and depicted iconographically on materials from Moundville and Spiro (see Lankford 2007) indicating a shared knowledge of this journey as well as a desire to depict it in multiple contexts and media. I cite this Plains Path of Souls not to draw a one-to-one correlation between these practices and those of Cahokians, but rather to recognize the likely-hood that such places were not just functional constructions used in shows of prestige and power, but were potentially persons guiding the dead to their final resting place, or helping the living bury their community or family members. At the heart of such perspectives are relationships;

relationships among the earth, the sky, the dead, and the living that are continuously negotiated through movements and 'doings'.

Mound Artifacts

Few artifacts were located in the fill above feature 1 or within feature fill and likely come from historically disturbed contexts (Tables 5.6, 5.7, Figure 5.13). Artifacts from Taylor's excavations were located at the Illinois State Archaeological Survey and analyzed as part of the overall project. The artifacts collected by Taylor include pottery and lithic materials, and based on his excavation plan map these materials likely came from the area of human remains/the wall trench building and the area directly south of the wall trench structure, located partly within unit L (discussed above as a disturbed area of both prehistoric and historic fill). The pottery sherds collected from Taylor's excavations span the Lohmann to early Moorehead phases (circa AD 1050-1250) with one Yankeetown sherd (specific to Native American peoples from Indiana) collected from one of the small conical mounds directly west of Rattlesnake Mound (identified on the original collection bag as "surface of low conical mound 150 ft. west") (see Figure 5.14, 5.15). At an elevation of 95.35 m asl in the northwest corner of Feature 1 two grog-tempered sherds were recovered during these most recent excavations. This area and elevation corresponded to the area inside the upper corner of the structure and above the remnant basin fill. A grog-tempered plain, Lohmann phase jar shoulder was also recovered from the eastern wall trench.

Additional artifacts of note recovered from the 1927 excavations include one red slipped punctate seed jar from the area south of the recovered human remains and the wall trench structure. Five Moorehead phase jars were also identified in Section 14, the area of the 31 sets of piled human remains. This location also contained a possible (Fisher) Oneota-like jar rim and handle, one Lohmann phase jar rim and one TLW phase jar rim further confusing the chronological affiliation of the human remains and structure (see Table 5.6, see Figure 5.14, 5.16). Taylor and Moorehead (see Pauketat and Barker 2000: Figure 10) also note the presence of a 'granite' discoidal recovered from the shoulder area of one of the bundles (this discoidal was not available for analysis).

Overall, the artifact assemblage leaves much to be desired and the lack of the direct location and elevation of the 1927 recovered materials from the area of the bundled human remains and the wall trench structure do not help in determining chronological affiliation. The presence of both Lohmann phase vessels (n=5) and Moorehead phase vessels (n=6) suggests that this area was utilized from the Lohmann phase through the Moorehead phase, or that the Lohmann phase sherds were accidental inclusions in the fill further supporting the hypothesis that this is a temporally late building and addition to the mound. Due to the lack of datable material identified in context, the most confident chronological assessment is that this structure and the associated human remains is a Late Stirling-Moorehead construction based on size and orientation of the structure (see Collins 1990, Mehrer and Collins 1995) and the inclusion of Moorehead phase pottery rims in the fill surrounding the remains.

Mound Human Remains

As part of Taylor's original excavation he and his team uncovered a series of bundle burials interred 3 feet below the original ground surface between grid blocks 15-19 A-F, approximately 65-70 feet from the original trench summit (Figure 4.15) in an area roughly 9 m x 7 m on the southern side of the mound. The area of human remains was interred directly on top of the wall trench building (6.6 m x 4.3 m) and was oriented roughly to 113^{o} of azimuth. The remainder of this section discusses the burial context and summarizes the data from the analysis of the collected remains. I begin by transcribing Taylor's (1927; cited by Moorehead 1929: 72) original accounts of excavation as they provide the best insight into the mortuary context:

> On May 18, at three feet below the surface (-26.0' B M) in section 15-C, we uncovered a human skull. This was badly decayed. As were also the humeri and femora that accompanied it, and all were so firmly bonded in the gumbo that none could be preserved for measurement. In reality the bones themselves had completely disintegrated and left only their shape and color as a portion of the soil in which they originally lay. Soon after this discovery was made, a bundle of three other skulls likewise accompanied by the heavier limb bones was found in the same section. In this case, however, a red sienitic granite discoidal, three inches in diameter and one inch thick, almost as perfectly fashioned as if it had been turned out on a lathe, lay at the point of the lower jaw of one skull…an almost continuous bed of human skulls, humeri, ulnae, radii, femora, tibiae, and fibulae was cut into [the gumbo], but no other bones appeared…Burials appeared to be deposited in bundles of from two to six skulls with their corresponding limb bones, and teeth were so irregularly mingled with the mass that except for an occasional somewhat better preserved skull or bundle of skulls, identification of individual burials was impossible…What might have been a sort of altar appeared at a depth of one foot below the surface in section 16-B. This was circular, disc-like formation of orange-yellow earth, of somewhat denser texture than surrounding soil, and was one foot thick and five feet in diameter…Femora and other limb bones accompanying skulls usually lay parallel with the minor axis of the mound. As nearly as could be estimated, the remains of at least one hundred fifty burials had been found, but none of this material except the crowns of about two hundred teeth was fit for shipment, and these were mailed to Dr. Henry W. Gillett at New York.

At the time of excavation Taylor noted a prepared surface ("blue gumbo floor") upon which the 150 burials (Taylor's estimate) were interred with an orange/yellow disk shaped formation present in the center (feature 1). Taylor and his team explored the area but were unable to document any evidence of a building or structure of any kind. They abandoned that line of excavation and salvaged what was possible of the burials before completely excavating/destroying the remaining human remains and mortuary context.

The salvaged human remains were curated with the museum at Urbana, Illinois (University of Illinois) and also sent to a Dr. Gillet of New York (these remains could not be relocated). The remains discussed here were previously analyzed by Dr. Kristin Hedman of ISAS and are recounted from her notes and summaries as compiled by Julie Bukowski (notes on file ISAS). Due to the poor preservation of the remains only basic demographic data were recorded. Approximately 11 individuals were recovered from Rattlesnake Mound and consist of 7 subadults (12-20 yrs.) (based on teeth, discussed below), 2 adults, and 2 persons of indeterminate age; 1 adult was identified as male. Due to poor preservation no pathology or trauma was identified on any of the present elements (Bukowski et al. 2011).

Seven individuals were identified based on teeth alone and consist of remains A-E from section 15-D, and remains A and B from section 15-F as designated on Taylor's original plan map. Additional long bone fragments, and one badly decomposed cranial vault represent the remaining four individuals. The following is a brief summary of the 7 sets of teeth. Age based on dental eruption follows Ubelaker (1989) (see Hedman's original analysis notes on file ISAS).

Sec 15-D, A

Five teeth (RM^2, $RM^{`}$, RPM^2, LM^2, LM^1) were present for skeleton (SK) A representing a subadult at least 12 yrs. +/- 30 months. The absence of distal articular facets on the RM^2 and RM_2 indicate that the third molars were not in occlusion at the time of death. Minimal wear on the RPM^2 also supports an age of at least 12 yrs. Two large caries were present on the occlusal surfaces of both the RM^2, RM^1 and one LEH was present on the RM^1 at 0.27 cm from the CEJ.

Sec 15-D, B

Eight teeth ($RM^{1, 2, 3}$, $LM^{1, 2}$, $RM_{1, 2, 3}$, LPM_2) identify SK B as a subadult at least 12 yrs. +/- 30 months. Little to no wear was present on the upper and lower RM3 suggesting that these teeth were recently erupted. Minimal wear was present on the remaining teeth and no caries or LEH's were present.

Sec 15-D, C

Seven teeth represent SK C and include the $RM^{1, 2}$, RPM^2, LPM^1, LM^1, and the L and R M_1; with one LEH on the RPM^2 and 2 LEH's present on the LPM^1. This individual also showed evidence of minimal wear and the absence of a distal articular facet on the RM^2 indicating that the third molars were unerupted; age estimate is at least 12 yrs. +/- 30 months.

Sec 15-D, D

Four teeth represent this 15 y.o. individual and include both the left and right mandibular second and third molars. One LEH was present on the buccal side of the RM_2, with 1 small carie present on the occlusal surface of this tooth. Two small caries were present on the occlusal surface of the left M_2. No wear was present on any of the mandibular third molars and minimal wear was present on the mandibular second molars.

Sec 15-D, E

Two teeth represent this 15 y.o. individual: LM^2 and RM_2 with minimal to moderate wear present on both molars and a faint distal facet present on the LM^2. This suggests recent eruption of the left third molar prior to the time of death. Minimal calculus was present on the buccal side of the maxillary left second molar with no LEH's or caries present on either tooth.

Sec 15-F, A

Two mandibular teeth represent this young adult: LPM_2 and LM_1. Minimal wear was present on both teeth and no caries or LEH's were identified.

Sec 15-F, B

Five teeth represent this young adult (at least 12 y.o.): RM^2, $LM^{2,3}$, $LM_{1,2}$; the maxillary left second molar presented with no distal wear facets indicating the third molar was not in occlusion at the time of death. Very minimal wear was present on the occlusal surfaces of the maxillary and mandibular first and second molars; no LEH's and no caries were identified.

Miscellaneous Bone

Five unidentifiable long bone fragments were identified with the teeth from Sec 15-F; these fragments were unattributable to element and were in very poor condition. Two juvenile occipital bone fragments (2.6g) were identified from Sec 16-F. Four femoral shaft fragments encased in soil matrix (24.6g) were also identified from Sec 16-F; no pathology or trauma was evidenced on these fragments and no measurements were taken. One cranial vault in poor condition (encased in soil matrix) from the same context as the aforementioned elements was also present. It appears that the parietals and occipital are intact and that the cranium is likely from an adult individual (based on thickness of the bone when viewed in cross section).

Discussion

Although little data regarding age, sex, pathology, trauma, and post mortem processing is available for the remains from Rattlesnake Mound, three important characteristics can be gathered from Taylor's brief description and his plan map: 1) the remains were buried in a series of 31 bundles (accounting for an estimated 150 discrete individuals), 2) were placed directly on top of a wall trench building after the completed construction of Rattlesnake Mound, and 3) 64% of the identified remains represent subadults between the ages of 15 and 12. Rattlesnake's mortuary context seems to follow a pattern established at Mound 72 and Wilson Mound: the bundling and curation of remains for burial on top of a previously built and decommissioned wall trench building. Additionally, in each context, human remains were prepared for burial in the same manner: disarticulated and bundled together with multiple elements from different individuals and buried in a co-mingled context. Taylor alludes to this context when he discusses the multiple crania and long bones appearing as "a continuous bed of skulls" and limbs highlighting that the disarticulated burials were intentionally deposited at the same time (Moorhead 1929: 72). The presence of a high percentage of subadults in this context is unique and when compared to other ridge-top mound contexts across the three Cahokia precincts (East St. Louis, St. Louis and Cahokia) suggests that Cahokian's did not reserve ridge-top mound burials to just adults, subadults or children and instead included a range of ages and individuals in these processes.

RATTLESNAKE REVISITED

The excavation results from Rattlesnake Mound and the Rattlesnake Causeway indicate that the emergence of the Cahokia precinct was intimately bundled with ridge-top mortuary practice and a unique presencing of the cosmos on earth through the construction, location, and use of the Rattlesnake Causeway. The orientation of the causeway, which likely aligned the Cahokia grid, is critically important to reevaluating how and why Cahokia was built. The recognition that this feature is real, is early, and is oriented 5° east of north challenges the previous archaeological theories surrounding Cahokia's emergence and alignments (see Fowler 1997; see also Smith 1969; Wittry 2000, 1969). Specifically, this discovery shifts the focus away from Monks Mound, and Fowler's hypothesized Mound 72 Woodhenge as the primary and most important constructions at the site to the causeway and Rattlesnake Mound. The identification of the causeway does not, however, discount the importance of Monks Mound, but rather expands our understanding of how Cahokia was built to include the typically perceived 'peripheral' site areas into the core of Cahokia's planning and organization *(contra* Fowler 1997, for example).

The five-degree offset alignment and its relation to Rattlesnake Mound implies that Cahokian's envisioned a construction plan that focused on the cosmos in a way that incorporated the Great Spirit and the dead into their daily lives; the causeway at once oriented Cahokia and was potentially a physical manifestation of the Path of Souls that lead back to Rattlesnake Mound and possibly to the end of the 'earth-disk' or the known Cahokian world. Minimally, these data, when combined with what is known of ridge-top mortuary practice across the three precincts of Cahokia (see Chapter 4), indicates that such mortuary mounds were not singular, isolated monuments, but living spaces with shared characteristics and burial programs citing a broader understanding of how one might mitigate death.

As previously noted, Moorehead and Taylor's original excavation goal was to determine if Rattlesnake Mound was a natural or an artificially constructed landmass. Taylor's trench excavations encountered multiple hazards (heavy rains, trench wall collapse) during the course of the project hindering his ability to obtain detailed profiles of mound construction. They also missed/could not identify an important building directly associated with the burial area and with the mound itself. Taylor identified the area of human remains, removed the human remains and left the area open without further excavation, not noticing the 6.6 m x 4.3 m wall trench structure. The identification of this building is significant because the structure was likely built after the construction of Rattlesnake Mound; it was used for a short period of time (based on its single construction episode), and decommissioned to become the final resting place for approximately 31 pile burials of an estimated 150 individuals. The unique orientation of the building and its larger size indicates a Late Stirling phase association (see Collins 1990); specifically, the building orientation indicates a reorientation of mortuary space realigning Rattlesnake Mound to the summer solstice sunrise/winter solstice sunset (like at Mound 72). The use and decommissioning of this wall trench building indicates a repetitive series of events that I argue were part of a shared mortuary and religious practice shared across ridge-top mounds. The recognition of the later mortuary building indicates that Cahokian's continuously utilized this space, revisiting and re-orienting this area.

Although Taylor and Moorehead did report on the construction of the mound, they failed to identify the nuances of construction layers and sequences and instead focused on the issue of whether the mound was natural or aboriginal. By re-excavating the trench, these details were revealed, allowing for a more comprehensive understanding of how Rattlesnake was built. These details are important when comparing mound construction techniques; such similarities amongst both platform and ridge-top monuments aid in determining chronological affiliation. Mounds constructed and used during the Mississippian period were similarly built, typically with basket loads and mantle layers of specially colored and prepared soils (see for examples Pauketat 1993; Schilling 2010; Sherwood and Kidder 2011). Although no reliable datable materials were recovered from the Rattlesnake trench excavations or its associated building, it is very likely that the mound and associated building were constructed and used from the Lohmann phase up to the Late Stirling phase. I make this hypothesis based on contextual data from the mound itself (its long axis is oriented to Cahokia's 5° offset) and from the associated Rattlesnake Causeway (emanates from the central portion of Rattlesnake Mound), which dates to the Lohmann phase (1043-1104 A.D.).

Overall, the results from this recent excavation revealed a complex method of mound construction that featured at least 5 distinct construction episodes, executed in quick succession. My excavations also identified the construction and use of feature 1, the Stirling/Moorehead phase wall trench building (oriented to 113° of azimuth) located on the south side of the mound. The identification of this structure is important because it showcases the similarities amongst the known and excavated ridge-top mounds at Cahokia: they all (with the exception of Red Mound) are associated with a wall trench building that is later decommissioned, and in the case of Rattlesnake Mound, Mound 72, Powell Mound, Cemetery Mound, The Big Mound, The Great Mound and Wilson Mound covered over with human remains. Further, the evidence gathered on mound construction methods, chronological affiliation, and associated mortuary practices identify the importance of these happenings with the emergence and construction of the Cahokian precinct.

FIGURES

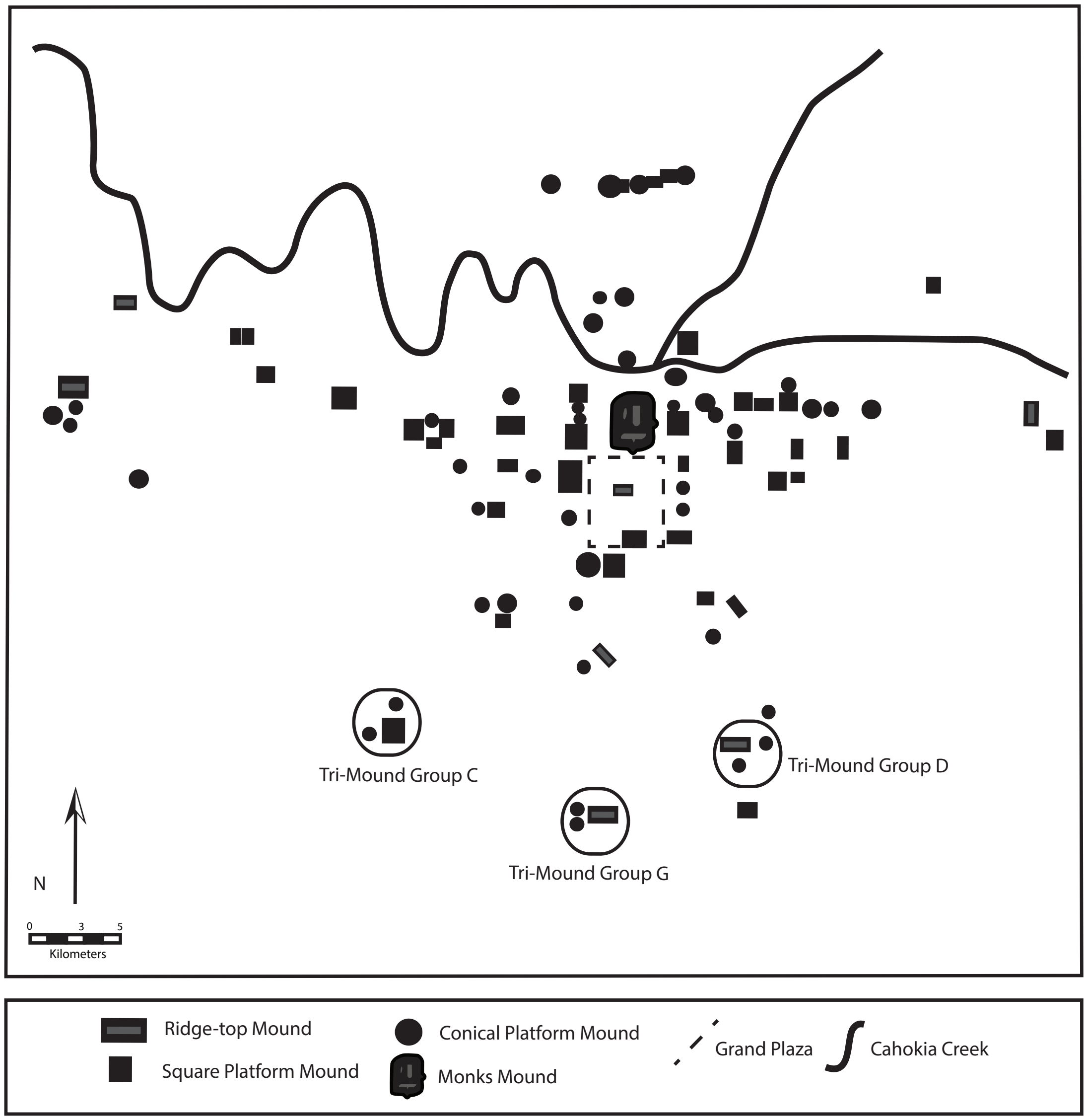


Figure 5.1 Cahokia Precinct, schematic identifying possible 'Tri-Mound' Groups including the Rattlesnake Area (Group G) (re-drawn from Demel and Hall 1998)

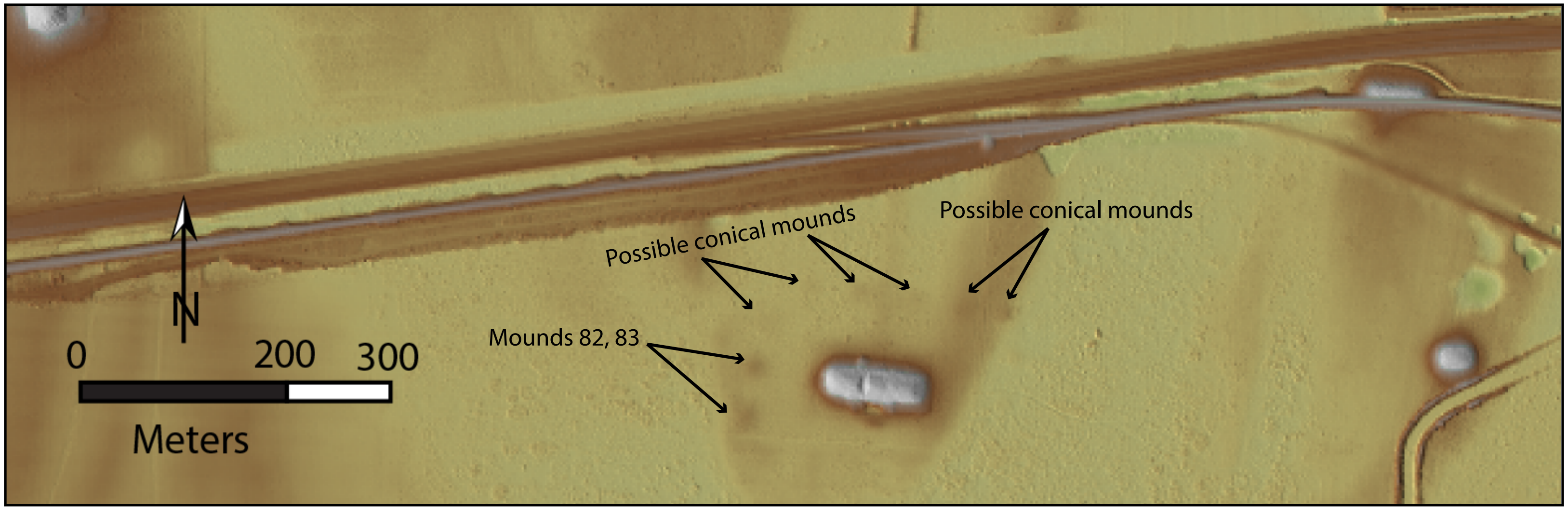


Figure 5.2 Rattlesnake Mound Area including Mounds 82, 83, 64 and showing possible other mounds (original LiDAR image courtesy ISAS)

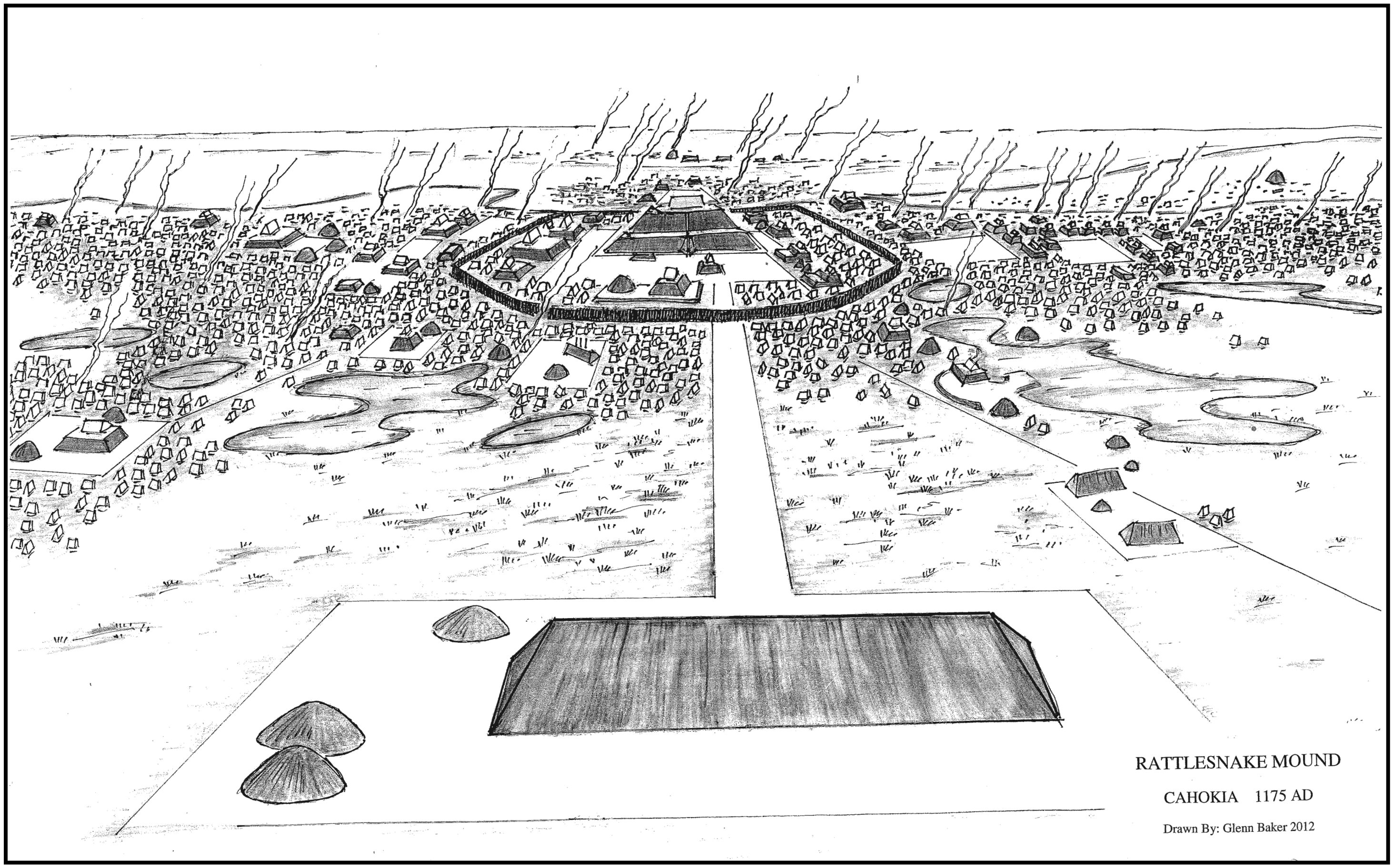


Figure 5.3 Artist Re-creation of Rattlesnake Mound and Causeway (used with permission, G. Baker)

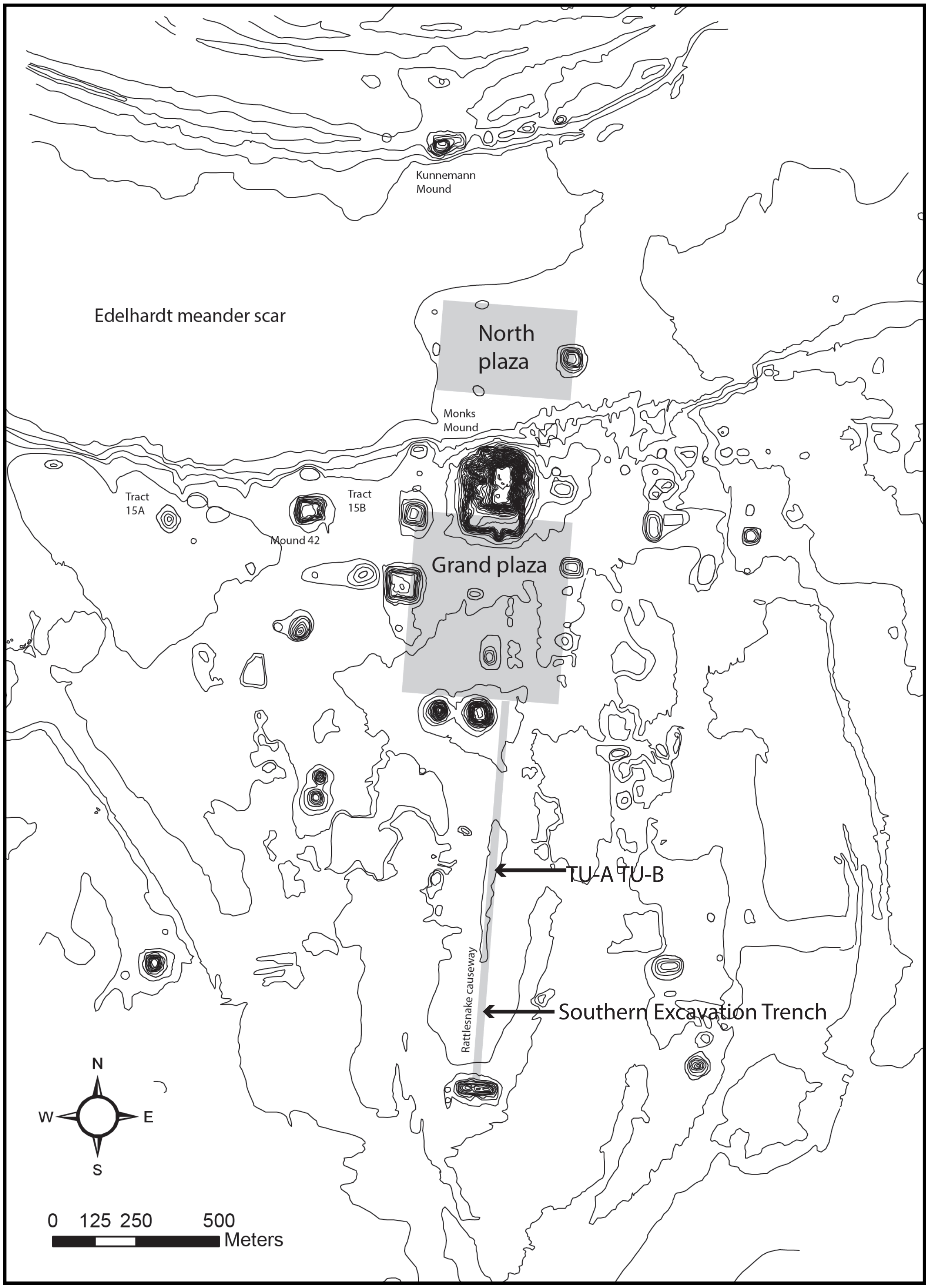


Figure 5.4 Downtown Cahokia, Rattlesnake Causeway and location of excavation trenches at Cahokia Grid Coordinates N: -1249.36 E: 126.70 (TU-A, B) and N: -1247.73 E: 137.44 (Southern Excavation Trench) (Original map from Fowler 1997; used with permission from T.R. Pauketat)

Figure 5.5 Rattlesnake Causeway Excavation Units TU-A and TU-B showing height of water table and ambiguous stratigraphy, view to south

Figure 5.6 Rattlesnake Causeway Southern Excavation Trench, west end showing causeway fill layers in profile, view to north

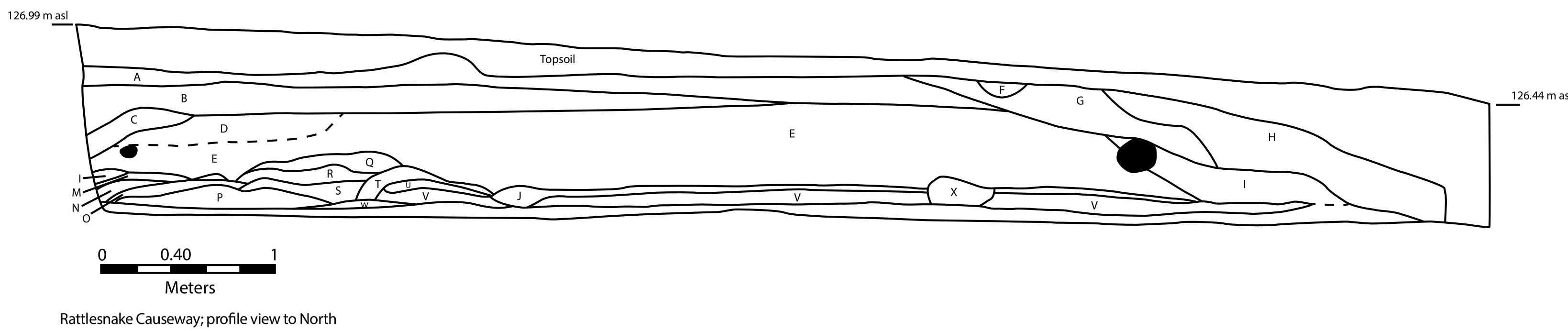


Figure 5.7 Profile Rattlesnake Causeway, Southern Excavation Trench view to north

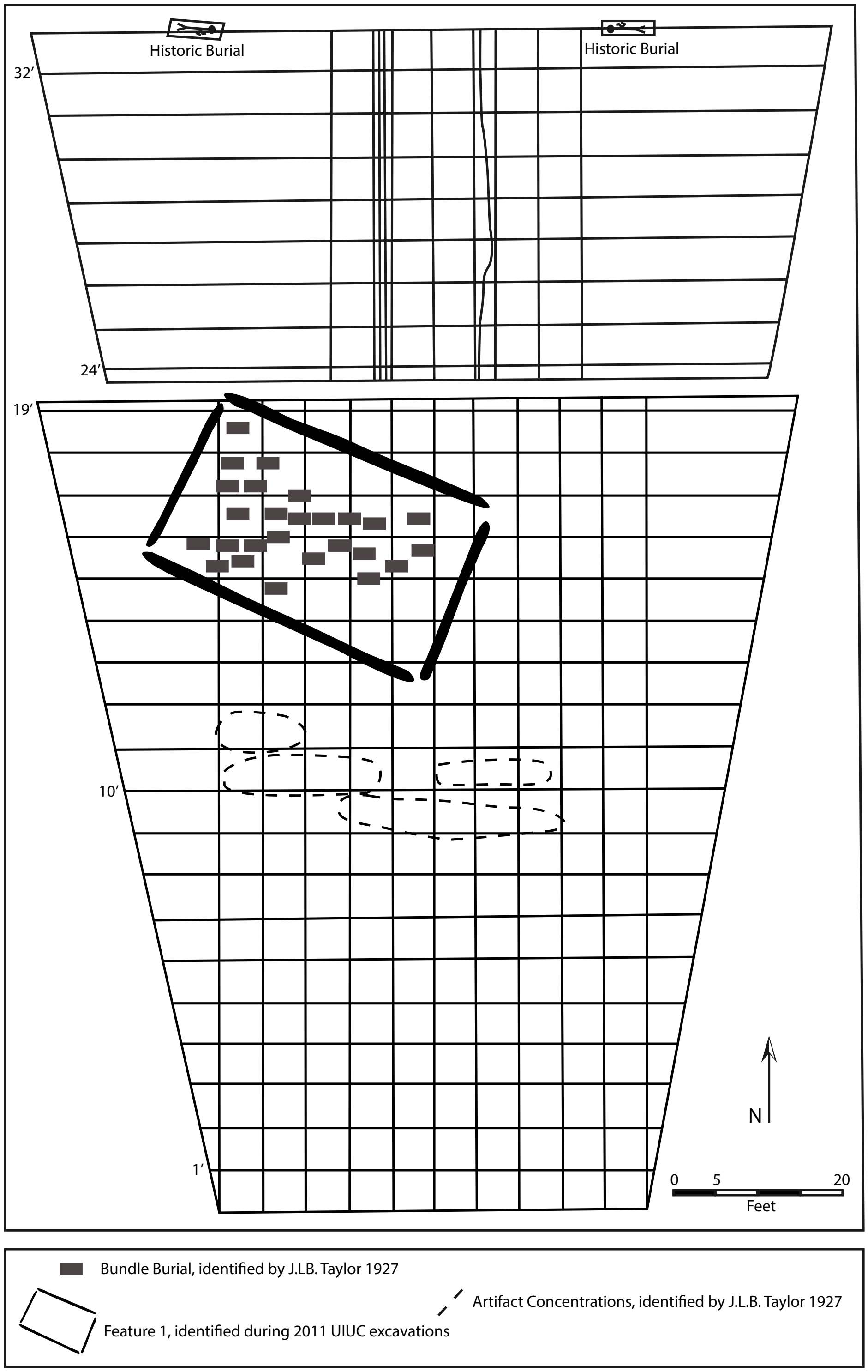


Figure 5.8 1927 Rattlesnake Trench Plan with location of Feature 1 (building to scale of Taylor Grid) and bundle burials identified by J.L.B Taylor excavations (re-drawn from Taylor 1927)

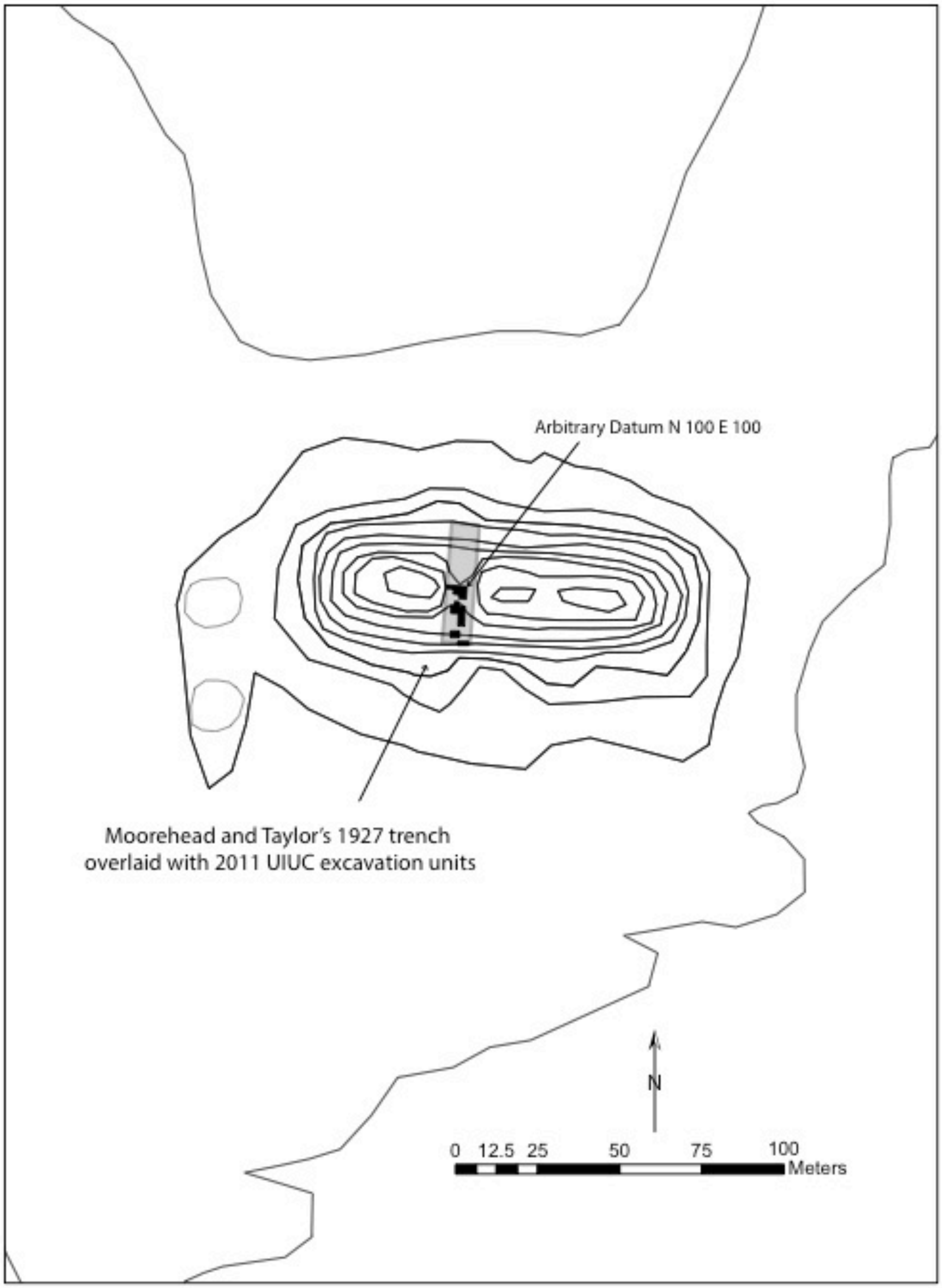


Figure 5.9 Rattlesnake Mound showing Moorehead and Taylor 1927 trench cut (in grey) superimposed by 2011 UIUC excavation blocks (in black) (see Figure 5.10 for close up of unit layout)

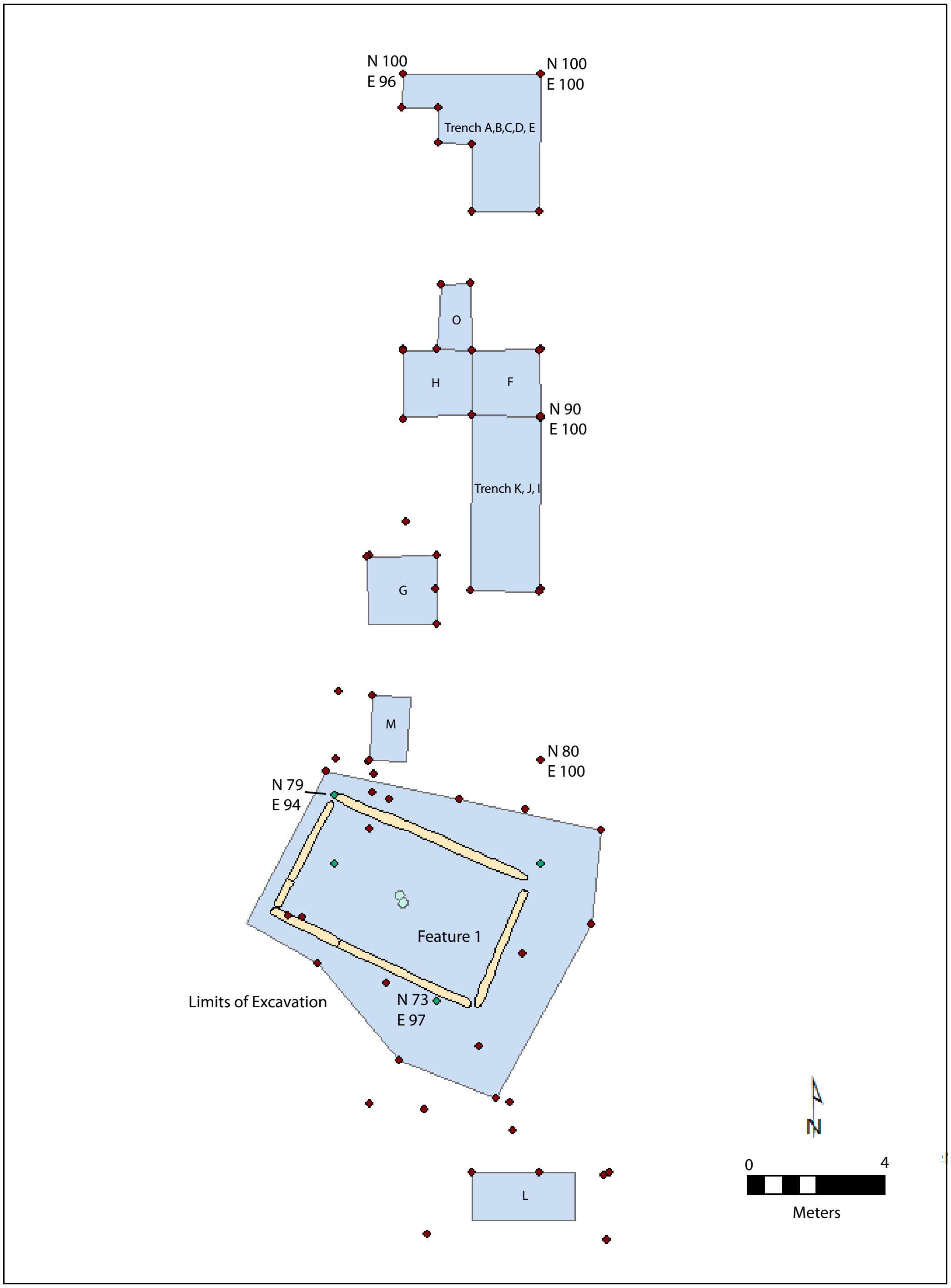


Figure 5.10 Rattlesnake Mound unit plan view showing excavated units, arbitrary grid coordinates (in red and green), and feature 1 (see Figure 5.9)

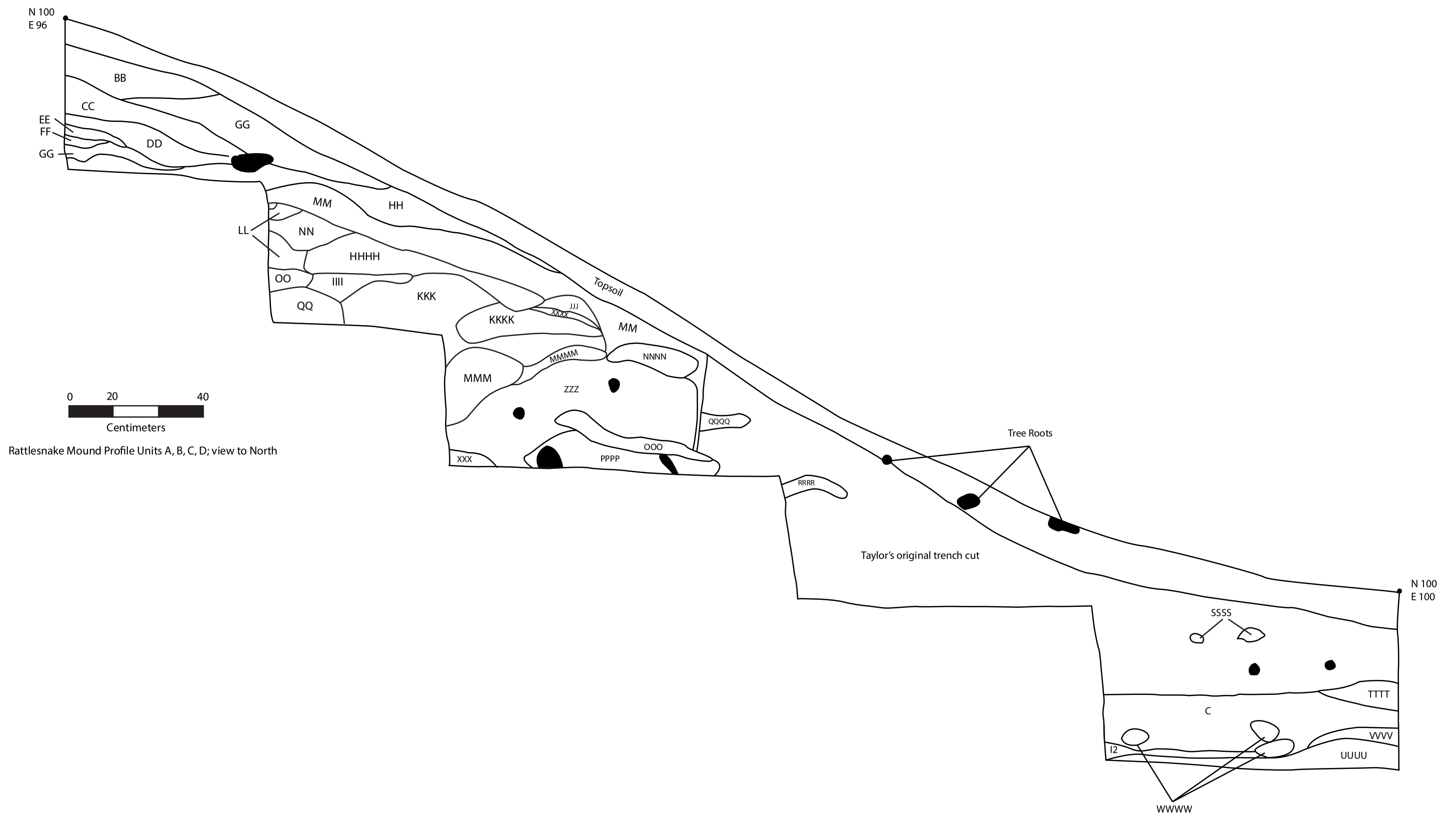


Figure 5.11 Rattlesnake Mound Profile Units A, B, C, D, view to north

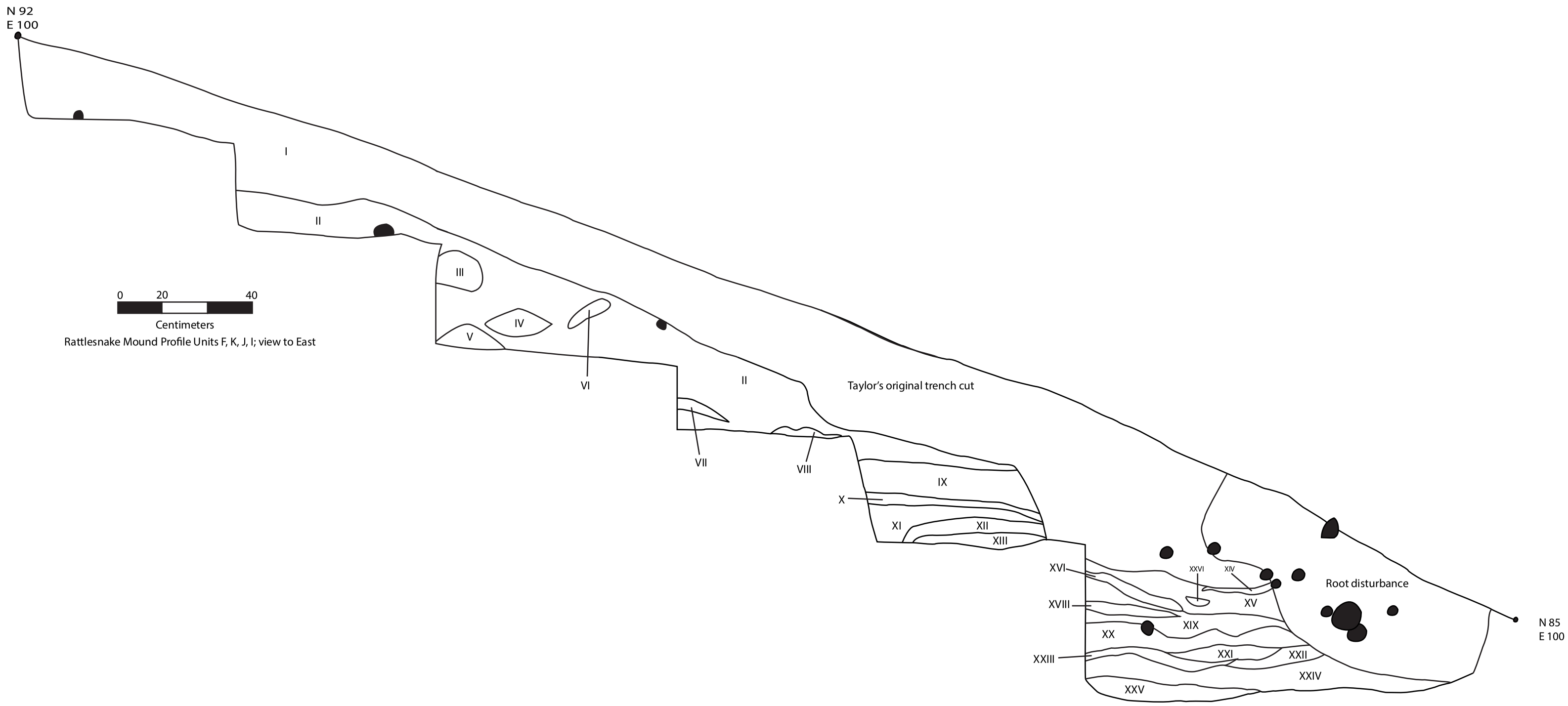


Figure 5.12 Rattlesnake Mound Profile Units F, K, J, I, view to east

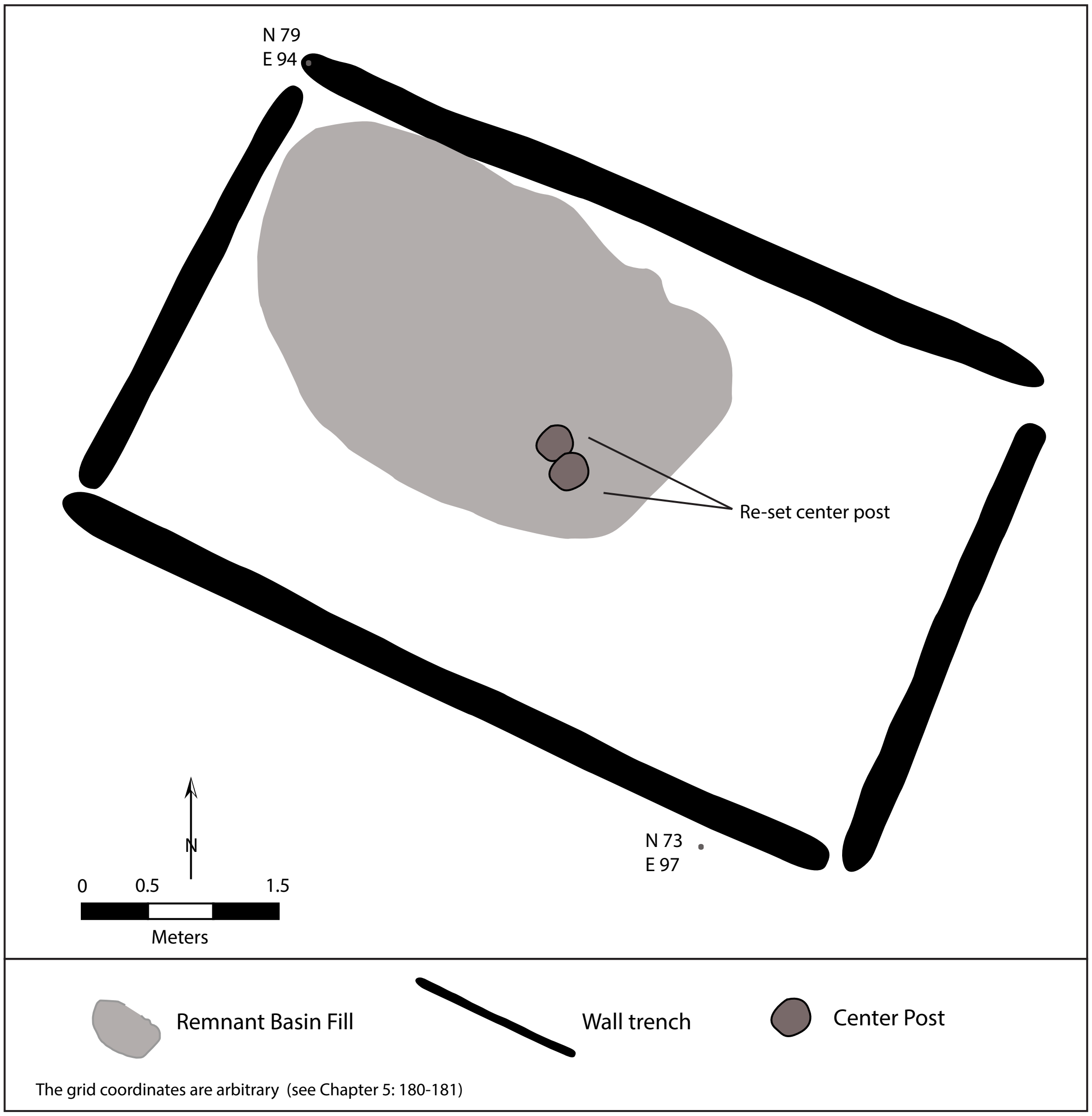


Figure 5.13 Feature 1 Plan Map showing building orientation, wall trenches, re-set center post and remnant basin fill

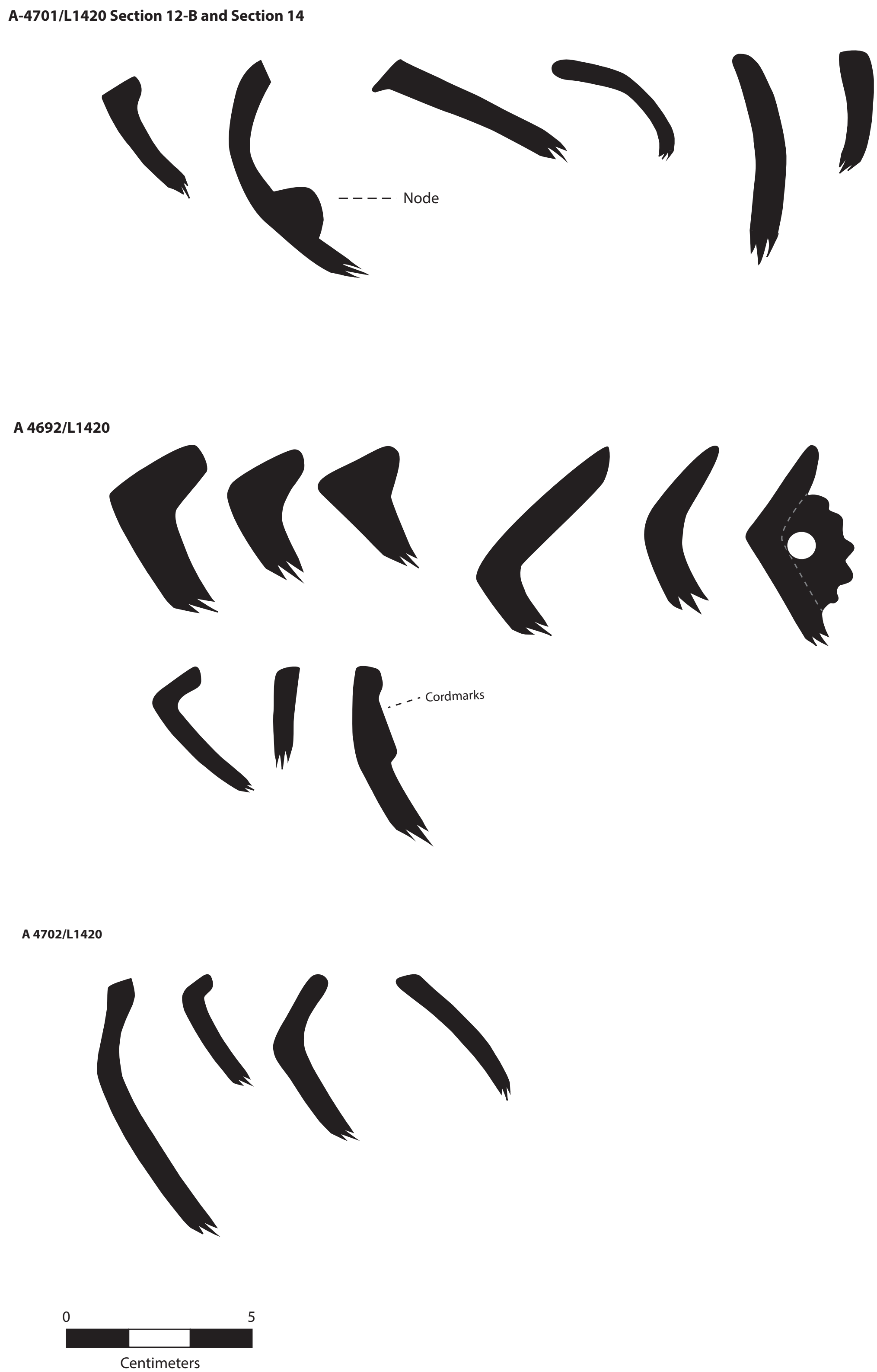


Figure 5.14 Rattlesnake Mound Pottery rims organized by excavation provenience and feature number

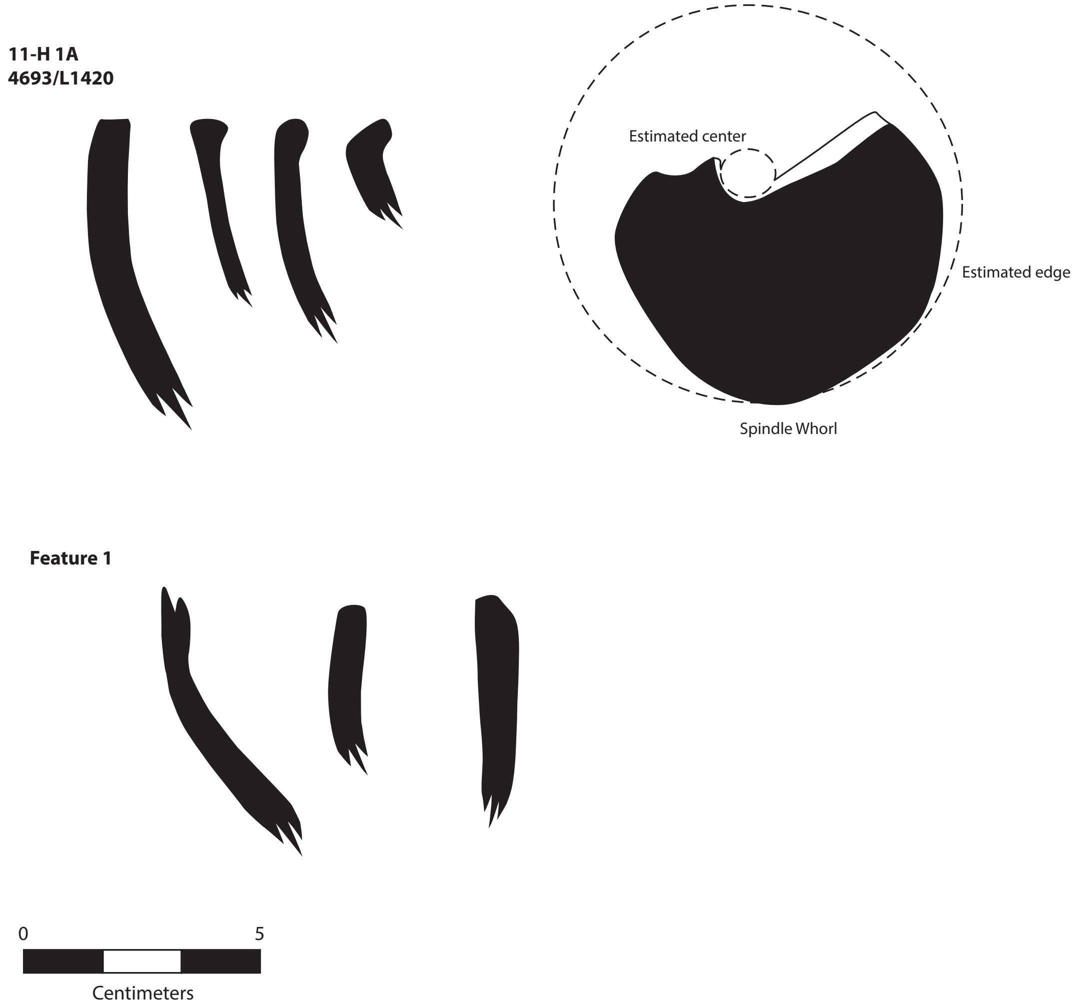


Figure 5.14 continued

Figure 5.15 Yankeetown pottery rim from Taylor excavations (A 4702/L1420) of Rattlesnake Mound and area, designated as from the 'low mound' area

Figure 5.16 Fisher-like rim from Taylor excavations (A 4692/L1420) of Rattlesnake Mound and area, designated as from Section 14 of the trench cut

TABLES

Point	Northing (m)	Easting (m)	Elevation at Highest Point (m asl)	Width (m)
1	4282082.486	755594.9416	126.94	28.58
	4282083.377	755623.5098		
2	4281907.243	755587.8733	126.71	19.46
	4281908.887	755607.2601		
3	4281517.787	755571.2871	126.54	24.17
	4281514.871	7555595.278		
4	4281788.086	755583.1756	127.06	18.17
	4281785.236	755601.1231		

Table 5.1 Rattlesnake Causeway UTM Coordinates and Height Estimates obtained from Quick Terrain Modeler and LiDAR image (see Figure 2.6)

Point	Northing (m)	Easting (m)	Length (m)
1	4282175.958	755611.2299	752.384
2	4281424.526	755574.9975	

Table 5.2 Rattlesnake Causeway UTM Coordinates and Length Estimate obtained from Quick Terrain Modeler and LiDAR image (see Figure 2.6)

Zone	Soil Description
A	10 YR 3/2 silty clay loam with many fine-medium mottles of 10 yr 3/3 silty clay loam
B	10 YR 3/1 silty clay loam
C	10 YR 3/2 silty clay with many fine mottles of 10 yr 3/3 silty clay loam
D	10 YR 3/1 silty clay with many very fine mottles of 10 yr 4/3
E	10 YR 2/2 silty clay with many very fine mottles of 10 yr 3/3 (soil texture is blocky with more clay than silt)
F	2.5 Y 4/1 clay
G	10 YR 3/2 silty clay
H	2.5 Y 5/1 silty clay with many medium mottles of 2.5 Y 5/2 and with fine mottles of 2.5 Y 2.5/1 silty clay
I	10 YR 2/1 silty clay
J	10 YR 3/1 silty clay loam with many fine mottles of 10 YR 4/3 and 10 YR 4/2 silty clay
K	10 YR 3/1 silty clay with many medium mottles of 10 YR 4/3 silty clay
L	10 YR 3/1 silty clay with many fine mottles of 10 YR 3/2 silty clay
M	10 YR 3/1 silty clay with few fine mottles of 10 YR 4/4 silty clay
N	10 YR 2/1 silty clay loam with many fine-medium mottles of 10 YR 3/4 silty clay with few fine mottles of 10 YR 2/1 silty clay
O	2.5 Y 2.5/1 silty clay loam with few fine mottles of 10 YR 4/3 silty clay
P	See zone N
Q	10 YR 4/1 silty clay with medium mottles of 10 YR 5/4 silty clay
R	10 YR 2/1 silty clay loam with many fine mottles of 10YR 4/3
S	10 YR 3/1 silty clay with fine mottles of 10 YR 4/3
T	10 YR 3/1 silty clay with many fine mottles of 10 YR 4/3 and 10 YR 3/3 silty clay loam
U	See zone Q
V	10 YR 3/1 silty loam
W	10 YR 2/1 silty clay loam
X	2.5Y 2.5/1 silty loam

Soil descriptions following Munsell Soil Color Chart (2011)

Table 5.3 Rattlesnake Causeway Fill Zones and Munsell Soil Color Descriptions

Zone	Artifact Type	Material Type	Temper/Slip	Heat Treated	No.	Weight	Comments
V	Bi-polar flake	Burlington	-/-	y	1	2.58g	informal side scraper
V	Bi-polar flake	UNID	-/-	y	1	4.62g	-
V	Flake	Burlington	-/-	y	1	0.59g	-
V	Bi-polar flake	Burlington	-/-	n	1	1.98g	-
V	Flake	Crescent Hills Burlington	-/-	n	1	0.64g	-
V	Flake	Crescent Hills Burlington	-/-	n	1	0.30g	-
V	Flake	Crescent Hills Burlington	-/-	n	1	0.81g	-
E	Flake	Crescent Hills Burlington	-/-	n	1	0.70g	-
E	Flake	Ste. Gen	-/-	n	1	2.71g	-
E	Pottery body sherds	-	limestone/plain	-	11	3.09g	-
V	Pottery body sherds	-	shell/dark slip	-	1	0.76g	-

Table 5.4 Rattlesnake Causeway Artifacts

ISGS #	Site Name	Provenience	Sample Material	$d^{13}C$	14C yr BP	+/-	calibrated two sigma	P=	Cultural Affiliation
A2427	Rattlesnake Causeway	interface between zones V and J	Charcoal	-24.9	900	20	1043-1104	0.50	Lohmann
							1118-1209	0.50	Late Lohmann-Early Stirling
A2387	Wilson Mound	Ftr. 25	Burned wood post	-26.1	1030	20	983-1026	1.00	Terminal Late Woodland
A2388	Wilson Mound	Ftr. 25	Burned wood post	-16.5	1040	20	975-1024	1.00	Terminal Late Woodland
A2389	Wilson Mound	Ftr. 12	Burned wood post	-25.5	1000	20	989-1044	0.92	**Early Lohmann**
A2390	Wilson Mound	Ftr. 12	Burned wood post	-15.6	975	20	1017-1052	0.51	Early Lohmann
							1081-1128	0.47	Lohmann
							1135-1152	0.11	Early Stirling
A2391	Wilson Mound	B.C. #3	Marine shell	0.86	1280	20	1052-1195	1.00	Lohmann-Stirling

Dates run at the Illinois Geological Survey by Dr. Hong Wang
Dates calibrated using CALIB REV 6.0.0 Copyright 1986-2012 M Stuiver and PJ Reimer; Stuiver and Reimer (1993)
This standard deviation (error) includes a lab error multiplier.
2 sigma = 2 x square root of (sample std. dev.^2 + Delta R uncertainty ^2)
where ^2 = quantity squared.
[ ] = calibrated range impinges on end of calibration data set
0* = cannot calibrate due to nuclear testing C-14.
1955* or 1960* denote influence of nuclear testing C-14
P= probability
NOTE: Cal ages and ranges are rounded to the nearest year which may be too precise in many instances. Users are advised to round results to the nearest 10 yr for samples with standard deviation in the radiocarbon age greater than 50 yr.

Table 5.5 Calibrated C^{14} Dates

Zone	Soil Description
C	10yr 5/3 clay w/many fine to medium mottles of 10yr 3/1 clay
BB	10yr 4/1 silty clay with few medium mottles of 10yr 5/2 clay
CC	10yr 3/1 clay with many fine mottles of 10yr 3/2 silty clay
DD	10yr 4/2 silty clay with many fine mottles of 10yr 3/1 silty clay
EE	10yr 3/1 wet silty clay
FF	10yr 4/2 silty clay with few medium mottles of 10yr 3/1 clay
GG	10yr 2/1 clay
HH	10yr 3/1 clay w/many fine mottles of 10yr 4/2 clay
LL	10yr 3/1 silty clay w/many very fine mottles of 10yr 4/2 silty clay
MM	10yr 3/1 wet silty clay w/many fine mottles of 10yr 4/2 clay
NN	10yr 4/2 clay w/few very fine mottles of 10yr 2/1 clay
OO	10yr 4/2 clay wi/few fine mottles of 10yr 2/1 clay
QQ	10yr 3/1 silty clay
TT	10yr 4/3 clay w/many fine mottles of 10yr 3/1 clay and many fine mottles of 10yr 4/1 clay
KKK	10yr 3/1 silty clay w/many very fine mottles of 10yr 5/3 silty clay
MMM	50% mottled 10yr 3/2 clay & 10yr 4/3 clay
XXX	10yr 2/1 sandy clay w/many very fine mottles of 10yr 4/3 clay
ZZZ	10yr 4/1 silty sandy clay
GGGG	10yr 3/2 clay w/few very fine mottles of 10yr 4/4 clay
HHHH	10yr 2/1 silty clay
IIII	50% mottled 10yr 4/2 silty clay w/many fine mottles of 10yr 2/1 silty clay
JJJJ	10yr 4/2 clay w/many very fine mottles of 10yr 2/1 clay
KKKK	50% mottled 10yr 4/3 clay, 10yr 3/1 clay, 10yr 5/2 clay
LLLL	10yr 3/1 silty clay
MMMM	10yr 4/2 w/many fine mottles of 10yr 3/1 clay
NNNN	50% mottled 10yr 3/1, 10yr 5/2, 10yr 4/2 all clay
OOOO	50% mottled 10yr 2/1 clay & 10yr 2/1 clay
PPPP	50% mottled 10yr 4/2 clay & 10yr 2/1 clay
QQQQ	10yr 4/2 clay
RRRR	50% mottled 10yr 4/2 clay & 10yr 2/1 clay
SSSS	10yr 3/2 clay
TTTT	10yr 5/2 clay
UUUU	10yr 2/1 clay
VVVV	10yr 3/1 clay
WWWW	50% mottled 10yr 3/1 clay & 10yr 4/2 clay
XXXX	10yr 3/2 silty clay
I2	10yr 3/1 clay

Soil descriptions following Munsell Soil Color Chart (2011)

Table 5.6 Rattlesnake Mound Construction Fill Zones and Munsell Soil Color Descriptions, West to East Trench

Zone	Soil Description
I	Taylor's original trench cut, no color taken
II	10yr 4/2 silty clay w/few medium to large mottles of 10yr 4/3 silty clay & few large mottles of 10yr 3/1 silty clay
III	10yr 4/3 silty clay w/common medium to large mottles of 10yr 3/1 silty clay
IV	10yr 4/2 silty clay w/few large mottles of 10yr 3/1 silty clay & 10yr 4/3 silty clay
V	10yr 3/2 silty clay w/few medium mottles of 10yr 4/2 & 4/3 silty clay
VI	10yr 3/2 silty clay w/few medium mottles of 10yr 4/2 & 4/3 silty clay
VII	10yr 4/2 silty clay w/few medium to large mottles of 10yr 3/1 & 4/3 silty clay
VIII	10yr 4/2 silty clay
IX	10yr 3/1 silty clay (very homogenous)
X	10yr 4/2 silty clay w/few large mottles of 10 yr 3/1 silty clay
XI	10yr 3/2 silty clay (very homogenous)
XII	10yr 4/3 silty clay w/few large mottles of 10yr 3/2 & 4/2 silty clay
XIII	10yr 2/1 silty clay (more silt than clay) (very homogenous)
XIV	10yr 2/1 silty clay
XV	10yr 3/2 silty clay w/few medium mottles of 10yr 4/2 silty clay
XVI	10yr 4/2 silty clay w/common fine to medium mottles 10yr 3/1 silty clay w/common fine mottles of 10yr 4/3 silty clay & common fine redox features
XVIII	10yr 4/2 silty clay w/few fine to medium mottles of 10yr 3/1 silty clay & common fine redox features
XIX	10yr 3/1 silty clay w/common very fine mottles of 10yr 4/2 silty clay
XX	10yr 4/2 silty clay w/few medium mottles of 10yr 3/1 silty clay
XXI	10yr 2/1 silty clay (more silt than clay) (very homogenous)
XXII	10yr 3/1 silty clay (homogenous)
XXIII	10yr 4/2 silty clay w/common fine mottles of 10yr 3/1 silty clay & common fine redox features
XXIV	10yr 2/1 silty clay (very homogenous)
XXV	10yr 4/2 w/few large mottles of 10yr 3/2 silty clay & common fine redox features
XXVI	10yr 4/2 silty clay w/few large mottles of 10yr 4/3 & 3/1 silty clay

Soil descriptions following Munsell Soil Color Chart (2011)

Table 5.7 Rattlesnake Mound Construction Fill Zones and Munsell Soil Color Descriptions, North to South Trench

Provienence										
Bag Information		Orifice Diameter (cm)	Wall Thickness (WT)	Lip Length (LL)	Lip Index (WT/LL)	Vessel Type	Temper	Component	Treatment	Comments
	UIUC Excavations									
F1-6	Feature 1	Rim broken	0.5	-	-	Jar	grog	Lohmann?	E	-
F1-20	Feature 1	<5	0.88	-	-	Bowl	grog	Lohmann?	E	-
F1-3	Feature 1	<5	0.67	-	-	Jar	shell	Lohmann?	E	-
	Taylor/Moorehead Excavations									
MA4693		12	-	-	-	Bowl	sand?	?	E	Pot is reconstructed, glue and method of reconstruction make it dificult to determine temper
A-4701/L1420	Sect. 12 B	18	0.64	0.87	0.74	Jar	shell	E. Lohmann	P	
A-4701/L1420	Sect. 12 B	16	0.72	1.03	0.69	Jar	shell	E. Lohmann	DSB	
A-4701/L1420	Sect. 12 B	16	-	-	-	Bowl	limestone	E. Lohmann	RS	
A-4701/L1420	Sect. 12 B	12	0.86	1.08	0.79	Seed jar	limestone	E. Lohmann	RS	Two rows of punctates near lip
A-4701/L1420	Sect. 12 B	14	0.52	2.67	0.2	Jar	grog + some shell	?	E	Node present on body below rim
A-4692/L1420	Sect. 14	18	-	-	-	Bowl	shell	?	P	
A-4692/L1420	Sect. 14	20	-	-	-	Constricted Bowl	shell	?	RS	
A-4692/L1420	Sect. 14	14	0.55	1.51	0.36	Jar	grog	Lohmann?	E	
A-4692/L1420	Sect. 14	20	1.02	2.12	0.48	Jar	shell	Moorehead	CM	Cahokia Cordmarked; Verticle CM (too eroded to identify twist)
A-4692/L1420	Sect. 14	18	1.13	2.43	0.46	Jar	shell	Moorehead	CM	Cahokia Cordmarked; Verticle S twist CM
A-4692/L1420	Sect. 14	24	0.84	2.45	0.34	Jar	shell	Moorehead	E	RS interior lip, thick lip
A-4692/L1420	Sect. 14	22	0.74	-	-	Jar	grog	Late Woodland	CM	Collared Rim, lip notches; Verticle S twist CM
A-4692/L1420	Sect. 14	12	0.6	-	-	Jar	shell	?	-	Notches on body near lip; perforated when clay was wet
A-4692/L1420	Sect. 14	24	0.93	4.65	0.2	Jar	shell	Moorehead	E	
A-4692/L1420	Sect. 14	18	0.79	2.93	0.26	Jar	shell	Moorehead	E	Rim is broken; groove underneath lip
A-4692/L1420	Sect. 14	~16-14	0.72	2.99	0.24	Jar	shell	Oneota?	-	Notched handle, trailed lines on body; int. rim notches
A-4702/L1420	Surface of low mound 150 ft. west	16	0.56	1.02	0.54	Jar	shell	Lohmann	EDS	int. DS
A-4702/L1420	Surface of low mound 150 ft. west	~30	0.56	2.26	0.25	Jar	shell	Moorehead	E	
A-4702/L1420	Surface of low mound 150 ft. west	16	-	-	-	Constricted Bowl	grog + shell	Lohmann?	RS	
A-4702/L1420	Surface of low mound 150 ft. west	14	-	-	-	Bowl	shell	Lohmann?	RS	
A-4702/L1420	Surface of low mound 150 ft. west	12	0.59	0.62	0.95	Jar	grog + shell	Yankeetown	-	Intricate notched pattern on lip and body
11-H/A-4693/L1420	-	18	0.55	0.67	0.82	Jar	shell	Lohmann	DS	
11-H/A-4693/L1420	-	16	0.51	0.6	0.85	Jar	shell	Lohmann	RS	
11-H/A-4693/L1420	-	24	0.65	0.72	0.9	Jar	shell	Lohmann	E	
11-H/A-4693/L1420	-	28	0.84	0.8	1.05	Jar	shell	Lohmann	P	

DS dark slip, RS red slip, Brwn brown slip, B burnished, Pol polished, CM cordmarked, LN lip notches, P plain, E eroded, ext. exterior, int. interior

Table 5.8 Rattlesnake Mound Rim Sherds

Temper		UIUC Excavations F1		UN		UL		Taylor/Moorehead Excavations A-46921/L1420 Sect. 14		A-4701/L1420 Sect. 12-B		A-4693/L1420 Sect. 11-A		A-4701/L1420 Sur. Low Md.	
	Surface	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)
Shell															
	CM							2	14.8						
	RS	1	2.1					1	2.8	7	27.6	5	19.5	1	8.5
	DS									7	27.4	7	67.4		
	PL	12	10.2	4	0.7			2	49.3	45	180.9	24	123.9	26	138.9
	Other														
Limestone															
	CM											1	28.3		
	RS									11	32.8	7	42.2		
	DS											1	3.8		
	PL									1	16.5			4	18.4
Grog															
	CM									2	19.1				
	RS														
	DS														
	PL									7	66.5	4	11.4	1	17.7
	YT									1					
Grit															
	CM														
	RS														
	DS														
	PL									1	6.2	1	2.1		
Sand															
	CM														
	RS														
	DS														
	PL											5	10.4		
Red Ochre		24	5.7			13	0.5								
Burned Clay		44	31.5			4	14			14	28.7	4	17.1	4	30.5
Ceramic Disk															

^ Red slipped interior
* Powell Plain
+ Incised
CM (cordmarked), RS (red slipped), DS (dark slipped), PL (plain), YT (Yankeetown)
F (Feature) U (Unit)

Table 5.9 Rattlesnake Mound Body Sherds

	Taylor/Moorehead Excavations										
	A-4683/L1420 Sur.		A-4684/L1420 28 ft. Und. Stn. 47		A-4686/L1420 Sect. 16-B		A-4689/L1420		A-4692/L1420 Sect. 14		A-4693/L1420
Groundstone	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)	no.
Sandstone			1*	8.9							3
Sandstone Abrader									1	20.5	1
Limestone	1	74.2			1*	6.6					
Hammerstone											1
Burlington Chert											
Flake Tool							5	35.2			
Drill							1	3.5			
Scraper									1	8.3	
Point											1^
Debitage							11	113.6			
Core							5	73.8			
Biface Fragment											
Crescent Hills Chert											
Flake Tool							3	11.4	1	6.5	1
Debitage							3	12.3			
Salem Chert											
Flake Tool											
Debitage											
Core											

* Burned
^ Middle Woodland Makers Point

Table 5.10 Rattlesnake Mound Lithics, Taylor/Moorehead Excavations

Sect. 11-A, H	A-4696/L1423 Sect. 16-A		A-4698/L1423 Sur. 16-B		A-4700/L1420 Sect. 11-G		A-4701/L1420 Sect. 12-B		A-4702/L1423 Sur. Low Md.	
wt. (g)	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)
63.6			1	252.7			1	69.3	2	264.9
44.6							3	69.7		
	3	145.9					1*	20.2		
15.7										
					10	86.6	4	13.1		
15.4										
					27	173.4			1	2.6
					3	47.1				
									1	5.2
1.6										
									1	1.7
					1	18				
					2	15.2				
					2	82.9				

Table 5.10 Continued

	UIUC Excavations					
	F1		**U N**		**U L**	
Groundstone	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)
Sandstone						
Sandstone Abrader						
Limestone					1	0.7
Spud	1	41.6^				
Burlington Chert						
Flake Tool						
Drill						
Scraper						
Point						
Debitage	2	9.3	1	23.3		
Core	2	1.6				
Burin	1	6.3				
Crescent Hills Chert						
Flake Tool						
Debitage						
Mill Creek Chert						
Flake Tool						
Hoe Blade						
Resharpening Flake	1	0.1				
Core						

* Burned
^ Re-worked
F: Feature; U: Unit

Table 5.11 Rattlesnake Mound Lithics, UIUC excavations

CHAPTER 6

CONSTRUCTING MORTUARY SPACE: Wilson Mound

"As soon as the families, the phratries, and the tribes had agreed to unite and have the same worship, they immediately founded the city…and thus the foundation of a city was always a religious act."

-Numa Denis Fustel de Coulanges, 1956

Preston Holder 's 1954-55 excavations of Wilson Mound are little known and present a unique context to further investigate ridge-top burial practices at Cahokia ca. AD 1050 (but see Alt and Pauketat 2007; Milner 1982; Young and Fowler 2000). Understanding the chronology, construction methods, and location of this mound are important to evaluating ridge-top mortuary practice across the Cahokia, East St. Louis, and St. Louis precincts, as Wilson Mound is a unique manifestation of religious mortuary practice ca. AD 1050. Archaeologists have previously suggested (see Alt and Pauketat 2007; Milner 1982; see also Holder notes on file UMMA) that Wilson Mound was an isolated, late mortuary mound constructed on the edges of the Cahokia precinct; however, new radiocarbon dates and my recent re-evaluation and re-analysis of Holder's original notes, maps, and artifacts reveal that Wilson Mound was not a singular late construction, but was imbedded within the broader context of ridge-top mortuary practices that began with Cahokia's emergence ca. AD 1050, sharing similarities with not only Mound 72, but also Powell Mound, Rattlesnake Mound, and The Big and Cemetery Mounds in the precincts of East St. Louis and St. Louis, respectively.

My re-analysis of Wilson Mound presents new data on ridge-top mortuary mounds and enhances the data presented in Chapters 4 and 5, exploring the complex happenings at Wilson Mound in relation to similar experiences at Rattlesnake Mound, Mound 72 and other ridge-tops. I begin with a re-analysis of Preston Holder's excavations, followed by an analysis of the artifacts recovered from his fieldwork. The human remains recovered from Wilson Mound are presented, in detail, in Chapter 7.

WILSON MOUND

Wilson Mound (11SC^{o}J), located 1.4 km southwest of Powell Mound on the western boundary of the Cahokia precinct, was a small ridge-top constructed amongst a series of small mounds (Powell Mound #2 [Mound 88] and Chucallo Mound) connecting the East St. Louis and Cahokia precincts (Alt and Pauketat 2007: 234; Pauketat 2010) (see Figure 2.2). Wilson Mound, also known as Junkyard Mound, was partially bulldozed in September of 1954 for the construction of the Indian Mounds Motel, currently located on Collinsville Road in Fairmont City, Illinois (Holder notes on file University of Michigan Museum of Anthropology [UMMA]; see also Alt and Pauketat 2007; Fowler 1997) (Figure 6.1, 6.2). Community members alerted the Anthropology Department at Washington University in St. Louis, MO to the destruction, which revealed multiple features, human remains, and artifacts on at least two stages of mound construction and use. Upon hearing about the destruction, Preston Holder (Washington University) went out to view the site and in October 1954 began a salvage excavation on the remaining intact features and mound construction stages. The details of the excavation were never published by Holder but are recorded in extensive notes, maps and letters (on file UMMA), and briefly summarized by Alt and Pauketat (2007) and Milner (1982, 1984).

Holder's excavation consisted of a series of discontinuous trenches set up within an arbitrary grid system (based in increments of 50 feet) throughout the remaining portions of intact mound fill: the lower pre-mound occupation level, two mortuary features, and a series of pits and features associated with the intermediary mound construction levels (Figure 6.3, 6.4).

Benchley[3], an archaeologist who worked with Holder, explained the grid as consisting of two lines (A and B) laid out at right angles to one another starting at a point about 200 ft. south of Highway 40 "and at the edge of the blacktop city street marking the westerly edge of the city 'block' in which the site lay" (notes on file, UMMA). Benchley additionally notes that "this section of Fairmount City is laid out with 'N' about 50^{o} east of magnetic 'N' and I laid out my grid over the old mound remnant in line with the Hwy 40 and the city street to the west" (notes on file, UMMA). The grid centered on "an existing unmarked concrete post with a tetrahedral top [which was used as] the main datum point" (Archaeological Data Sheet: 37). The transit was set up over the top of this concrete post and lines A and B were laid out at right angles to one another. Line A was oriented N 49^{o} 59' 40" E of magnetic N with subsequent stakes placed at 50-foot intervals along the A and B lines. Stakes A_{80} B_0, A_{80} B_{50}, A_{96} B_0, A_{96} B_{50}, were used as references for the trenches that bisected the remaining portions of the mound. Holder notes that "the B_0 line runs N S, [and] the A_0 line runs E W," when following the 'N' designation used by Fairmount City. Line A parallels Highway 40 and line B parallels the city street. Holder, in a description of this grid in a sketch map, further describes the grid noting some confusion during the original orientation of this grid system. To clarify Holder states that the A line parallels highway 40 and increases along this trajectory; the B line parallels the city street and increases along that trajectory (see Figure 6.4) (Holder notes on file UMMA).

Holder identifies as least eight separate excavation trenches in his notes; AB grid coordinates typically identified the remaining profiles and features. Correlating these profiles to one another and to the main mound profile was difficult as Holder originally did not put his AB grid coordinates or the location of the trenches onto his overall mound profile or plan map, he only indicated with solid lines (as opposed to dotted lines) where profiles of trenches and

[3] Benchley was not identified with a first name, but was identified as a man and not to be confused with Elizabeth Benchley.

features were drawn on the profile map (see Figure 6.4). Figure 6.4, however, includes Holder's arbitrary grid overlaid onto his plan map indicating the location of features in relation to his grid. On the main mound profile map Holder did not include the location of feature 25 or the L-shaped building, both of which were located below and adjacent to initial mound construction phases on a pre-mound occupation level. Holder's profile of Wilson Mound, as seen in figure 6.1, was approximately taken along the B_{60} line providing a short axis view of the mound. Feature 25 and the L-shaped building are identified on the plan map and when combined with the descriptions from the notes, indicate that both of these features were constructed and used prior to the addition of the first core platform mound (see below discussion, Figures 6.3, 6.4).

Archaeological 'finds' (artifacts or other concentrations of material or sediments) and features were identified with AB grid coordinates and elevations recorded in feet on Archaeological Data Sheets (Table 6.1, 6.2). Not all recorded features have an associated profile map or plan map to accompany the notes and descriptions. Attempting to correlate mound profiles with particular trenches (1-8) and with the location of particular finds and features proved difficult, and for the majority of the recorded features was not possible due to a lack of associated AB grid coordinates. Key features (pit #2, Burial Complex # 3, feature #25) identified by Holder on the main mound profile were more easily placed into the overall mound stratigraphy.

Holder concluded that Wilson Mound was approximately 12' high (or 3 m), roughly 150' x 150' (45 m x 45 m), with the mound's long axis oriented roughly northwest to southeast. Based on these measurements, which are similar to Mound 72, Wilson Mound was significantly smaller than Rattlesnake and Powell Mound indicating that ridge-tops did not necessarily adhere to a prescribed size; Holder's estimated size likely reflects the dimensions of the basilar platform mound constructed prior to the addition of the ridge-top cap and does not accurately reflect the final dimensions of the complete ridge-top mound.

When Holder first surveyed Wilson Mound in 1954, portions were already removed and truncated by modern construction (the addition of a billboard and a farm house were placed on top of the mound). He notes that the “northerly apron has been removed presumably at the time of the last widening of Highway 40” (notes on file, UMMA). A modern farmhouse was constructed on top of the mound, but had burned down prior to Holder’s excavations; the basement and an outhouse were still intact in 1954. Holder gathered a few pottery sherds from the area of the outhouse and the farmhouse foundation noting that they “all fall in the Mississippian [time] categories at Cahokia proper” (notes on file, UMMA). Holder’s preliminary impression was that “this was a two component truncate pyramidal ‘temple mound’ in typical Mississippian tradition and probably late”(notes on file, UMMA). When Holder viewed the mound’s destruction in September 1954, he noted that the entire northerly mound face had been sliced back about twenty feet leaving a standing wall 6 feet in height (with the upper 6 feet removed previously when the farmhouse and outhouse were built on top of the mound), noting that this wall “was entirely of black gumbo, basket-laid, and represented the final cap to the mound” (notes on file, UMMA).

During Holder’s excavations, from October 1954 to April 1955, human remains were removed from a mortuary feature located on a primary stage of mound construction. Holder’s excavations also uncovered a burned sub-mound building, an L-shaped building, and at least three other pits (likely monumental post pits) (notes on file, UMMA) and particularly targeted the four intact phases of Wilson Mound: 1) the lower pre-mound occupation level, 2) the mortuary feature, 3) a series of pits and features associated with intermediary construction levels, and 4) two final phases of mound construction (Table 6.3).

According to Holder, the occupation of the Wilson Mound area began with a **1)** Woodland village site and features 1, 2, and probably feature 10 as well as a "submound pit" (L-shaped building). Feature 1 consisted of a "dark greasy layer of clay loam, much organic material, charcoal…and the base and side rim sherd of [a] Woodland pot" (Book 1: 21). Feature 10, a wall trench, was likely intrusive into this original Woodland occupation surface. Although Holder's original excavation notes identify an L-shaped 'submound pit' present on this Woodland occupation surface; this feature was more likely an L-shaped building intrusive to this earlier Woodland period surface. The L-shaped building contained burial #5 and at least seven other crania located in its interior. I explore this building In more detail in the next section of this chapter. Holder notes that this occupation was abandoned "long enough for a sand wash layer, feature 14, to accumulate" (Book 1: 72). Following this Woodland occupation Holder identified an **2)** early Mississippian occupation composed of a series of features and a wall-trench/post-hole structure (feature 25). He identifies feature 18 (line of post molds, not associated with feature 25), feature 19 (some sort of structural trench-like deposit), feature 14 (sand wash layer), and a hearth. Holder suggests that this occupational surface dated to the early Mississippian period due to a broken "Powell Polished Plain" jar located in the interior of feature 25 on the structure floor (Book 1: 72). Following this early Mississippian occupation the **3)** first mound building stage consisted of the 3'6" basket-loaded mound of clean brown sand that closed off the early Mississippian occupation zone. Pit 2, (also called feature 2) dug into this brown sand layer and the previous Woodland occupation level to feature 1 (it is unclear if this pit goes through feature 1), was approximately 6' x 4' (2 m x 1 m) and was dug, filled, re-dug and then re-filled aboriginally; it contained a heavy concentration of charcoal and red ochre on the pit bottom.

This first mound construction phase was then covered over with a black gumbo clay layer. Burial Complex #3 was located on the northeastern flank of this initial platform mound directly on top of pit 2. Holder notes that the burial of the B.C. #3 human remains occurred rapidly as no wash lenses were present in any of the fills used to construct the burial feature or to cover over the human remains. Burial Complex #3, located on the northeastern flank of the core platform mound, consisted of approximately 190 individuals buried in a 4.25 m x 5.5 m area. These individuals were interred in a series of 43 bundle or "pile burials" and 5 primary burials (notes on file UMMA; see also Alt and Pauketat 2007; Milner 1984). Based on Holder's notes and my re-analysis of the human remains, adults, children, infants, males and females were all present in this burial pit. There is no discernible pattern regarding age and sex, and most of the remains are included as bundles of skulls and long bones, with the exception of the three primary interments that include women and infants (see Chapter 7). In a letter accompanying the remains sent to the Smithsonian Institution, Holder (notes on file, UMMA) describes the mortuary feature:

> But most of all we found burials…But on the flank of the first mound, clearly all buried at once within a very short space of time (a few days or so), we found more than 40 burials all neatly arranged in a space 18' x 18' and in one level…In addition to the 5 primary burials there were 40 some "secondary" burials from three to six individuals each with the long bones neatly bundled and the skulls carefully piled at one end. From the neatness I assume the long bones had been wrapped in some hide or cloth sheet. In a couple of cases we found hundreds of disc Busycon beads in a context that made it look as though the bones had been wrapped in a beaded sheet of some sort…There was a somewhat gruesome detail of two women laid out side by side either as primary or ligatured burials; I suspect the former since one of them had a nearly full term fetus in situ in the abdominal region and the other had the articulated skeleton of a very young child laid between her legs with the head near her pubic regions.

Importantly, B.C. #3 revealed an unprecedented context that both Holder and wife Joyce Wike believed to be sacrificial and dedicatory in nature. The presence of two of the female primary burials particularly shaped this interpretation leading Wike to focus on the sacrifice of the women and children present in the burial pit as central, foundational and important burials. The inclusion of children and infants, in particular, bothered Wike and her notes reflect her feelings of discontent at excavating and analyzing the remains (notes on file UMMA). Upon completing the excavation of this feature, the salvageable human remains were sent to the Smithsonian Institution where they remain today.

B.C. #3 was enclosed by an approximately 2-3' (~1 m) zone of basket loaded grey, white, and yellow sands and a thin lens of compact black clay completing the first stage of mound building and beginning the final stage. Holder notes that this core platform mound and stage surface was covered over by **4)** a "6-8' [1-2 m] secondary mound of basket-loaded gumbo. This was again a fast job [with] no water laid lenses" and served as the gumbo cap that created the final ridge-top shape (Book 1: 73).

Holder noted the similarities of the Wilson Mound construction sequence to Powell Mound in a letter he sent to the Smithsonian noting the presence of features, charcoal, and "amorphous pits" on a primary mound stage as similar to the identification of the two burial pits and features present on a primary stage of Powell Mound (notes on file, UMMA). This similarity led Holder to call Wilson Mound a "temple mound in all of its stages", highlighting the presence of over 100 disarticulated individuals buried in B.C. #3 as evidence for its admittance into this category of specialty mounds.

Features, Mound Layers and Overall Sequence of Mound Construction Events

The following contains detailed descriptions of pre-mound/mound features, mound layers and overall construction sequences documented by Holder during his 1954 and 1955 excavations that were *not* included in his own short summary of events as presented above. Using Holder's maps and notes I have reconstructed the Wilson mound construction sequence. In the following I begin first with the early Mississippian occupation, followed by the first stage of mound construction, the details of Burial Complex #3, and end with the final episode of construction. The overall timeline of events follows closely to Holder's profile of Wilson Mound (see Figure 6.3) and is augmented with data gathered from his personal notes, feature data sheets, section profiles, and new AMS radiocarbon dates[4]. Please note that all of the quoted materials and sequences of events were taken from Holder's personal notebooks, feature data sheets and profiles all currently curated at the University of Michigan Museum of Anthropology. Measurements remain in feet as originally recorded by Holder.

Pre-Mound

Holder noted two occupation zones prior to the construction of Wilson Mound: 1) a Woodland period surface with at least one, intrusive L-shaped building containing the human remains of approximately 8 individuals, and a 2) Terminal Late Woodland (TLW)/Early Mississippian surface identified by a single-post/wall trench structure. Holder recorded little of this first surface (intrusive L-shaped building) with the exception of notating its "greasy" clay loam layer associated with a Woodland fragmented pot that held the disarticulated remains of likely more than one individual (see Chapter 7). Holder mentions the presence of human remains in this feature (hypothesizes that they were mostly children) and notes the destruction, by bulldozer, of a 'beaded burial' (see Chapter 7). Holder simply mentions the presence of this interment and provides no additional description. The identification of such a burial on a Woodland surface would be unique and I suggest instead, that this feature was likely a Mississippian period, Lohmann phase burial (if compared to other such known beaded burials from Mound 72 and Powell Mound, for example), intrusive to this Woodland period surface. The Woodland surface was then covered over by a sand wash layer and a later TLW/Early Mississippian occupation and feature 25.

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[4] In his notes Holder designates surfaces/occupation levels, buildings, pits, and burials by feature numbers; I continue with his terminology throughout this section and each feature is described in Table 6.2.

Holder's descriptions of this early occupational level lack important contextual data in regard to the L-shaped building. This structure, instead of dating to the Woodland period, more likely dates to the Lohmann phase and was contemporaneous or immediately post-dates feature 25. Drawing on comparisons from Kunnemann Mound, L-shaped buildings are uniquely shaped structures with a small alcove extending off of one wall. These buildings typically date to the Lohmann and Stirling phases and contain prepared hearths and floors (Pauketat 1993). Holder includes the L-shaped building on his plan map, adjacent to feature 25, on a surface that pre-dates the construction of the first core platform mound. This pattern of construction is also seen at Kunnemann Mound, where an L-shaped building was constructed, used, re-built, and then burned down on a surface that pre-dated the construction of initial mound construction stages (Pauketat 1993: 43).

L-shaped buildings have been recorded from sites like Knoebel in the Richland complex dating to the Lohmann phase, the Robinson's Lake site dating to the Merrell phase, and from Cahokia dating from the Lohmann to Stirling phases (see Alt 2006; Collins 1990; Milner 1984; Pauketat 1998). Important for our understanding of the processes and practices enacted in the Wilson Mound area, L-shaped buildings were likely special-use structures typically cardinally oriented, as is the L-shaped building at Wilson Mound. They are uniquely shaped with a small alcove and are identified in religious and/or political contexts (see Collins 1990; see also Alt 2006). Additionally, the structure at Wilson Mound was paired with feature 25, a specially constructed and burned building that pre-dates the construction of the core mound. Although Holder did not provide a detailed plan or profile map of the L-shaped feature, this building was not a Woodland period pit, as Holder argued, but rather a unique building, oriented to magnetic north, containing the human remains of at least eight individuals, and filled-in with a greasy clay loam prior to the construction of Wilson Mound.

Contemporaneous with the L-shaped building was a small (4.2 m x 2.6 m) wall trench/posthole structure (oriented with its long axis northeast to southwest, Holder notes "oriented long axis east to west"[Book #2: 1]) (feature 25) located on this TLW/Early Mississippian pre-mound surface at the following grid points: NE corner $A_{94}B_{13}$, SE corner $A_{92'4''}$ $B_{20'5''}$, NW corner $A_{80}B_{10}$, and SW corner $A_{78'2''}$, $B_{18'11''}$ at an elevation of 86' (Figure 6.5; see Figure 6.4). Holder first identified this structure as an "old occupation level…by the fact that the characteristic 'swirling' of the color differences of the basket loaded [mound] fill stops abruptly" noting an increase in cultural materials and a change in soil texture from "soft granular" mound fill to "smooth stiff creamy" feature fill (Archaeological Data Sheet: 46). The feature fill consisted of charcoal, burned daub and thatch, and the burned remains and contents of a large early Mississippian (possibly Edelhardt phase) shell/grog-tempered vessel (find # 28/find #33) (with charcoal and charred corn kernels adhered to the interior walls) lying on the structure floor (see Figure 6.5). Red ochre was sprinkled around this burned pottery vessel, which contained charred corn and nut fragments.

Holder describes this building as very dark with a rectangular outline (Archaeological Data Sheet: 78). The feature plan map, however, depicts the southeastern long wall as angled to the northeast, shortening the eastern wall, and creating a trapezoidal shape; Holder notes this map "may be off in outline…looks rectangular in ground" (Book 2: 2) (see Figure 6.4, 6.5). Holder also noted an interesting change in the feature fill from the upper creamy clay fill to a lower "yellow clay-sand matrix". Although he does not discuss this fill in any detail, it is *very possible* that he described a yellow clay floor, similar to the yellow lined houses, temples, and pits identified at the Lohmann phase site of Pfeffer in the Uplands northeast of Cahokia (see Otten et al. 2007; Pauketat 2013). At one point (Archaeological Data Sheet: 64) Holder even calls this building a "temple", further indicating its uniqueness.

Joyce Wike, De Marais Nebgen, and Preston Holder identified 58 post molds about 3” to 4” in diameter, some with the post still intact (and burned) (about 1 ½” to 2” in diameter) extending down past the yellow lined floor about 4” into subsoil of feature 25. Holder also noted that a “shallow trench extended all around house” with grass daubed to the outside wall and down into the “trench to fill it” (although no wall trenches were marked on the plan map). The identification of shallow trenches located all around the house encasing the post molds indicates that this feature was an early wall trench structure with a yellow lined floor. Holder also noted that the structure “probably burned completely” as indicated by the charred remains of thatch, daub and posts. He also identified the door in the southeasterly corner marked by a “lintel” and a shallow depression possibly for draining rainwater away from the door (Book 2: 14-15). Additionally, this is the only ‘pre-mound’ building Holder identified, indicating that this surface was *not* just an occupational village level (as he suggests) but instead an isolated, special-use area with a building terminated through fire prior to the construction of the burial mound. Burned grasses, structural posts, daub and woven organic materials used to compose the roof were identified on the floor of the structure supporting the conclusion that this temple building was in fact burned.

Two AMS ^{14}C dates from feature 25 were collected from burned thatch and burned wood revealing two uncalibrated dates of 1030 ± 20 (Sample ID- A2387; $\delta^{13}C$ = -26.1 ‰), and 1040 ± 20 (Sample ID-A2388; $\delta^{13}C$ = -16.5 ‰) [5]. For the date 1030 ± 20 the calibrated age range is 983-1026 cal A.D. (p= 1.0) (calibrated at 2s using the program CALIB 6.0 [Stuiver and Reimer 1993]). For the date 1040 ± 20 the calibrated age range is 975-1024 cal A.D. (p= 1.0) (calibrated at 2s using the program CALIB 6.0 [Stuiver and Reimer 1993]) (see Table 5.3 for the calibrated and uncalibrated dates). Together these dates, 975-1026 cal A.D., place this structure in the

[5] Hong Wang and the Illinois State Geological Survey conducted the AMS radiocarbon dates.

Terminal Late Woodland period. The presence of a Mississippian period vessel (shell-grog tempered globular vessel), the yellow-lined clay floor, wall trenches, the sprinkling of red ochre, the northeast southwest building orientation, and the ultimate burning down of this building suggests that feature 25 was more likely a very early Lohmann phase special-use building associated with the emergence of Cahokia, and was not simply a TLW domestic structure.

Mound

Following the construction and subsequent decommissioning of feature 25, this early Lohmann occupation was covered over by a 1" yellow sandy fill layer (feature 9) that "paralleled the Woodland Feature 1"(Book 1: 72-75 notes on file UMMA). This 1" yellow sandy fill was first identified at an elevation of 87' (approximately one foot above feature 25) along the profile line B_{80}; this zone was one of the foundational layers of mound construction followed by a series of structural mound components consisting of feature 14 (dark clay/heavy gumbo/buckshot of buff clay), feature 18 (one line of post molds between $A_{130\text{-}140 \text{ and }}B_{50\text{-}60}$) and feature 19 described as "some sort of trench-like structural deposit" seen in profile $B_{80}A_{136\text{-}146}$ (Book 1: 23-26) (Figure 6.6). Following this sequence of structural mound deposits Holder noted the construction of pit #2, a large post pit with a small post extraction ramp (see Figure 6.4). Pit #2 was dug into the thin sandy mound fill layer to the pre-mound Terminal Late Woodland/Early Mississippian occupational surface (see Figure 6.3). Holder describes this pit as dug, filled-in, re-dug, and re-filled aboriginally, and with "sherds at the [pit] bottom [with] fill consisted of shiny black, greasy sand, charcoal bits, ochre, and few flint chips…yellow sand marks bottom of pit about 24" to 30" below surface" (Book 1: 36).

Following this series of sediment layers and the aboriginal excavation of pit #2 a black clay mantle was deposited at an elevation of 88' (feature 8, mound construction stage 1). Holder notes, "looks as though there is a small mound with a gumbo core covered with clay and gumbo mixture…seen as a horizontal floor" dipping down on the eastern and western edges (in the shape of a small platform mound) (Book 1: 24) (see Figure 6.3). Feature 12 was constructed 7" below this black clay cap, and first identified at grid points B_{60} $A_{132'6'' \text{ to } 150}$ at an elevation of 87' 3" (identified in exploratory trench #5). According to the original profile of this section of the mound (Archaeological Data Sheet: 70), feature 12 is identified by an oblique profile cut of the northwestern wall trench, which appears as a basin shaped and filled-in with a series of wash lenses, yellow/brown sand, and dark gumbo mound wash. Holder did not map this feature in plan or include it onto his overall plan map of Wilson Mound. He does note the presence of "several sherds…and at least one is shell-temper" as well as a concentration of sherds, materials, and burned thatch and charcoal "at the very bottom" of feature 12 underneath the brown sand fill zone (elevation 87') (Archaeological Data Sheet: 70, 76) (Figure 6.7; see also profiles in Figure 6.8). I interpret this "very bottom" as the floor of the structure where Holder and his team recovered "plenty of charred material in very bottom [on the feature floor]" (Archaeological Data Sheet: 70). This description indicates this wall trench building was burned (like feature 25) based on the presence of "plenty" of charred materials including thatch and daub *in situ* on the structure floor. Two AMS radiocarbon dates taken from the burned thatch located at the bottom (or floor) of feature 12 provided uncalibrated dates of 1000 ± 20 (Sample ID- A2389; $\delta^{13}C$ = 25.5 ‰), and 975 ± 20 (Sample ID-A2390; $\delta^{13}C$ = -15.6 ‰). For the date 1000 ± 20 the calibrated date range is 989- 1044 cal A.D. (p= 0.92) (calibrated at 2s using the program CALIB 6.0 [Stuiver and Reimer 1993]). For the date 975 ± 20 the calibrated date range is 1017-1052 cal A.D. (p=0.51) (calibrated at 2s using the program CALIB 6.0 [Stuiver and Reimer 1993]). This range (989-1052 cal A.D.) places the construction of feature 12 within the early Lohmann phase, approximately 10-20 years after the decommissioning of feature 25.

Forty three bundle burials and 5 primary interments (B.C. #3) were buried directly on top of feature 12 in a shallow, rectangular pit on a thin layer of gumbo clay Holder interpreted as mound wash (see Archaeological Data Sheet: 66, 70) (see Figure 6.3). B.C. #3 contained pottery, copper-covered ear spools, a chunkey stone, a bear tooth pendent, 24 whole conch shells and over 6,000 marine shell finished and unfinished disk and columella beads. Feature 13, a basket-laid sand matrix, was used to cap the 43 bundles and 5 primary interments, which was then covered by a relatively thin layer (2"-6" in thickness) of gumbo clay at an elevation of 88'. Holder notes the presence of a red-slipped sherd in B.C. #3 dating this feature to the Lohmann phase, at the earliest. One AMS radiocarbon date of an unfinished marine shell disk bead from this burial complex provided an uncalibrated date of 1280 ± 20 (Sample ID- A2391; $\delta^{13}C = 0.86$ ‰). For the date 1280 ± 20 the calibrated date range is 1052-1195 cal A.D. (p= 1.00) (calibrated at 2s using the program CALIB 6.0 [Stuiver and Reimer 1993]). Based on this date, B.C. #3 was constructed either immediately after the decommissioning of feature 12, or up to 143 years later, a wide and generally unhelpful range of time; however, both Holder and Nebgen refer to the *absence* of wash zones (with the exception of the thin mantle of gumbo clay) and soil horizons between the decommissioning of feature 12 and the burial of the 43 bundles and 5 primary interments of B.C. # 3. This event sequence indicates that B.C. #3 occurred early in the chronology of Wilson Mound construction; further, the presence of disk shaped marine shell beads indicate a date later than the calibrated date of AD 1052 narrowing the chronological affiliation of this burial complex to sometime in the early Stirling phase between AD 1100 and 1150 (see Pauketat 1997).

Minimally, B.C. #3 contained 43 bundle burials and 5 extended interments consisting of approximately 190 individuals spanning all age ranges and both sexes. Holder (Book 1: 57) described B.C. #3 as "beginning to look funny, everyone is smashed and thrown around; upper legs detached, women, children and carnage galore. Maybe late and epidemic? If ritual it must have been gory." What makes this context so unique is that the majority of the individuals were disarticulated and buried in 43 bundles (similar to Rattlesnake Mound). These bundles contained mainly legs, arms, articulated rib cages, spinal columns, and skulls (Figure 6.12). The bundles and primary interments contain children, infants, adults, and elderly individuals. The majority of information on the human remains was gleaned from field notes, maps and photographs; however, Holder did salvage a sample of these remains, which are now curated with the Smithsonian Institution (and analyzed extensively in Chapter 7). A re-examination of the curated collection documented basic demographic data, pathologies and trauma, and identified 21 elements (out of a total 308) with evidence of cut marks; these cut marks clustered near joints or along muscle attachments and are indicative of dismembering and de-fleshing skeletons (see Raemsch 1993; see also Milner 1984, 1982; see also Chapter 7). One adult male skull also showed signs of blunt force trauma to the back of the head. No other individuals, curated at the Smithsonian, had any other evidence of trauma.

The five extended inhumations contained two children and three adult females, described by Holder as buried with their legs bent at the knee, fingers and toes clenched, both with neonates or newly born infants placed on their chest or abdomen; and in the case of the second individual, her cranium was removed and buried cradled in the her own arm. Holder's wife Joyce Wike, pregnant herself at the time, was in charge of this section of the excavations and notes that she could barely bring herself to document and remove the remains as the scene of the deaths of the women and children deeply troubled her (see Holder's notes on file UMMA).

Additionally, the human remains in B.C.#3 were interred with a series of finished and unfinished disk-shaped marine shell beads, columellae beads, small *Marginella* sp. and *Prunum* *apicum* shell beads. These beads (n=6,782) were distributed across at least 8 bundles (37, 25, 26, 16, 42, 32, 27, 24) (Holder mapped beads in 6 bundles) and buried in piles or strewn across a particular bundle. Thirty-seven of the 6,782 beads were made from small *Prunum apicum* shells perforated on both the proximal and distal ends for stringing. Of the 6,782 total beads 6,327 are disk beads (both finished and unfinished). Thirty-nine of the beads were made from cut columellae (with the center of the columellae perforated for stringing) (see Appendix A; Figures 6.11, 6.12, 6.13, 6.14).

It is unclear from Holder's notes and maps if the beads were strung on clothing, blankets, or worn as jewelry. Holder also mapped 24 whole marine conch shells (*Busycon* sp. previously identified by Laura Kozuch in 1995) buried in 8 bundles. Ten of these conch shells were recovered in collections curated with the Illinois State Museum and show signs of being worked (portions of interior columellae removed, exterior whorls removed, apex ground down). These shells represent some of the raw material used in the manufacture of the marine shell disk beads present in the Wilson Mound mortuary context. B.C. #3 consists of bead-making material (whole conch shells), finished and unfinished beads, and multiple types of beads (disk beads, columellae beads, and small whole shell beads). No microdrills (used to perforated the center of the disk beads) or other bead working tools were recovered from the B.C. #3 complex, just the raw materials and products of manufacture.

Following the closure of B.C. #3 the two final episodes of mound construction were documented (Book 2: 72-73). Above the basket loaded sand layer (feature 13) enclosing B.C. #3 was the aforementioned compacted black gumbo clay cap (~1' thick, elevation of 88') that sealed the early platform mound and associated burials. This sequence was followed by an approximately 2'-3' thick layer of basket loaded grey sand deposited directly on top of the thin black gumbo mantle. In profile, this basket-loaded sand creates a fairly impressive platform shape that was quickly followed by the final black gumbo clay ridge-top cap (8' thick) completing the construction of the mound (see Figure 6.1).

Holder did not identify any "water laid lenses" in the series of construction episodes leading up to the burial of the individuals in B.C. #3, or during the subsequent placement of the final series of layers that composed the ridge-top cap (Book #1: 72-75). According to Holder, then, the only surface used for an extended period of time was the platform shaped core mound, which B.C. #3 was constructed upon. This is supported by Holder's description of feature 12 (AD 975-1044) as burning down and filling in with some water laid deposits prior to the addition of B.C. #3 (AD 1052-1195). Holder's identification of a *lack* of water laid deposits during the primary phase of mound construction favors a rapid construction of the basilar/ core platform mound, one that did not leave surfaces exposed to weathering, with the exception of feature 12 and the surface of the primary platform mound (see for examples Sherwood and Kidder 2011). Holder notes a similar series of events for the upper mound construction levels comprising the ridge-top cap.

Artifacts

In addition to collecting the human remains from B.C. #3, Holder did collect and curate a series of artifacts from multiple features and mound construction levels (see Tables 6.1, 6.4, 6.5, 6.6, 6.7, 6.8, 6.11). These include twenty-one pottery rims from the Woodland surface, feature 25 (small early Lohmann pre-mound building constructed on the original ground surface prior to the construction of the mound), B.C. #3 complex, and a series of trench features, and mound construction levels (Table 6.8) (Figure 6.8). Of the twenty-one pottery rims, four are from feature 25 and consist of one Lohmann phase shell tempered jar designated by Holder as pot 2 (Find #33) (Figure 6.9, Figure 6.10). Holders notes originally identify Find #28 as the pot identified *in situ* on the floor of feature 25, but bag information and the sherds themselves identify pot 2 (Find #33) as the pot identified *in situ* on the floor of feature 25. This pottery vessel (Find #33) contained corn and was left on the floor of feature 25 prior to it being burned down. Pauketat (1998) included this vessel in his analysis of the Kunnemann mound materials, but this pot is actually from feature 25 and features a dark slip exterior, red slip interior, and shell tempering, which is characteristic of the Lohmann phase (see Holley 1989). Three separate vessels were identified as find #28 and consist of one limestone tempered sherd, and two shell tempered sherds (see Figure 6.9).

Two shell tempered Lohmann phase jars are also included with the Primary Burial #3 in B.C. #3; it is not clear from Holder's notes if these jar rims were from intact vessels or accidental inclusions in the fill. Five additional Lohmann phase shell tempered jar rims were also included in feature 13 (the fill used to cover over B.C. #3) and were recovered with bundles 28 and 32. There is no contextual evidence to indicate that these rims were part of whole pots buried with any of the individuals as cached or curated items; it is more likely that these sherds were accidental inclusions in the fill post-dating B.C. #3 after the Lohmann phase.

Holder also describes recovering a "spur-handled cup (bean pot) in Powell Polished Plain" from B.C. #3. This vessel was lost after the Wilson Mound excavations, but Holder described it as "contained food debris, bird and fish bones" (Archaeological Data Sheet: 63). Holder also described a red-slipped beaker present in B.C. #3 at the interface of the compacted black gumbo clay layer and the basket-laid grey sand used to cap B.C. #3; I am inclined to argue that these are the same pottery vessels. The only image recovered of this vessel is difficult to interpret detail, but depicts a plain (not engraved) long-handled beaker possibly with a dark or dark red slipped exterior (Figure 6.11).

Bean pots (or fineware beakers) are typically well-made pottery vessels (of shell or fine grog temper), some with fine engraved design and reddish-brown exterior slips (see Pauketat

1998: 217). These vessels also have a long handle and flat bases, presumably, to facilitate drinking. For comparison, a beaker recovered from Tract 15 A at Cahokia is described as depicting an "elaborate quartered-circle motif engraved through a reddish-brown slip on its exterior" (Pauketat 1998: 217). Four beakers from the BBB Motor Site (located 1 km west of present day Collinsville, IL) were recovered from Stirling phase features and were "well-made, thin-walled, shell-tempered specimens with polished dark-slipped surfaces" (Emerson 1984: 308). Pauketat (2013b: 212) describes bean pots (beakers) identified at Tract 15 B as "engraved to produce a distinctive Cahokia Red Engraved beaker that, at one time, was considered as the classic Cahokia 'bean pot' used to define the 'Trappist' phase." In some contexts these later beakers depicted "world symbols or cosmograms" (Pauketat 2013b: 212). Typically these beakers, or bean pots, were associated with either the Stirling or the Moorehead phases (AD 1200-1300) and have been associated with Moorehead phase remains at Mound 33 and 34 (Pauketat 2013b: 217, 227). The beaker present in the Wilson Mound B.C. #3 context dates to the Stirling phase based on Holder's description of a dark-slip exterior and its lack of an engraved design. This description is more similar to the Stirling phase beakers identified at the BBB Motor site, Stirling phase, than any of the red or dark-slipped engraved beakers identified at Tracts 15 A and B.

The presence of both Lohmann phase shell tempered jars and one likely Stirling phase beaker does indicate that the B.C. #3 complex dates at least to the Lohmann phase and likely post dates AD 1050 based on the presence of pottery from the Stirling phase and over 6,000 marine shell disk-shaped beads, which have been hypothesized to date to the late Lohmann and Stirling phases (see Pauketat 1993; see also Fowler et al. 1999: Figure 10.3). The pottery recovered from Wilson Mound is not particularly unique and consists of 16 jar rims dating to the Lohmann phase, 1 red (or dark) slipped beaker (not relocated in the collection of curated pottery) dating to the Stirling phase, and three bottle rims and two bowl rims not attributable to a particular chronological phase (see Table 6.8).

Additionally, two bone, copper-covered ear spools were recovered from Burial Complex #3, Primary Burial #1 (Figure 6.19). These bone ear spools were found inside the jaw area of Primary #1 and feature copper staining, indicating they at one time were covered in a layer of copper. Similar copper covered earspools were recovered from a female burial at Dickson Mounds (Fulton County, Illinois) dating from AD 1050- 1150/1200, although made of wood instead of bone (Harn 1971: 19, 82). A single red pipestone ear spool was recovered from a similar mortuary context in Mound 72 in Burial 127 (Feature 402, 72Sub3), which dates to the late Lohmann-early Stirling phase (Fowler et al. 1999: 60). Additional copper staining suggestive of copper-covered ear spools, was present near the skulls of two other Mound 72 burials in Feature 229 (both women), which date to AD 1030 (Fowler et al. 1999: 44, 137). Ear spools recovered from mortuary contexts are not uncommon, but are unique. The presence of these objects, along with marine shell beads and other ornaments, indicate that individuals decorated their bodies with necklaces, bracelets, earrings, and pigments and that these decorations were maintained into the afterlife.

As previously stated a total of 6,782 beads were recovered from 8 bundles; all of the identified beads were made from marine shell species that included *Busycon sinistrum* (also known as *perversum*), *Marginella aureocincta,* and *Prunum apicum.* Importantly, these species of shell are recovered mostly from the gulf coast of Florida and are the most common shell used for bead production in the Cahokian Mississippian world (Kozuch 1998). In my analysis I followed Kozuch's (1998) categories of bead types, which includes disk beads, columellae beads, and whole shell beads (Figure 6.13, see Figures 6.14, 6.15). In addition to identifying the species of shell used to make the beads (if the bead was missing external markers of the whorl or apex species determination was not possible but, was inferred from the complete conch shell specimens included in the burial complex alongside the disk beads), I measured each complete bead (incomplete beads include broken beads and shell bead fragments) with calipers documenting the diameter of the bead, bead thickness and the drill-hole diameter; these averages are displayed by bundle in Figure 6.18 (see Figures 6.16, 6.17).

Thirty-nine of the beads included in B.C. #3 were tubular beads made from cut columellae and average 40.9 mm in length and 11.41 mm in thickness (Table 6.9). Thirty-seven of the 6,782 beads were made from small *Prunum apicum* shells, perforated on both the proximal and distal ends for stringing. Of the 6,782 total beads 6,327 are disk beads (both finished and unfinished); of the 6,327 disk beads, 4,105 disk beads were measured (2,218 disk beads were not included in the size averages because they were broken, fragmented, or otherwise not complete) (see Figures 6.16, 6.17, 6.18; see Appendix A for all shell bead measurements). The marine shell disk beads buried with B.C.#3 come from eight bundle contexts (16, 24, 25, 26, 27, 32, 37, and 42) (see Figure 6.16, see also 6.12). Each of these contexts contained multiple disarticulated individuals of both sexes and all ages (see chapter 7). Bundles 16, 25, 37, and 42 had additional whole conch shells (*Busycon sinistrum*) included with the human remains and disk beads. The beads that are mapped appear to be placed in piles on top of or underneath the disarticulated human remains; no beads were identifiably strung in the shape of garments, blankets, or jewelry.

Of the 4,105 disk beads measured 1,488 were unfinished with the majority present in bundles 25, 26 and 27 (see Figure 6.16). Unfinished disk beads were identified as squared instead of circular, and irregularly shaped "due to the presence of a conch or whelk gastropod whorl" intact on a surface of the bead (Fowler et al. 1999: 132). Pauketat (1993: 104) identifies unfinished disk-shaped beads at Kunnemann Mound as beads with roughened edges; I followed both Fowler and Pauketat's criteria identifying beads with roughened edges, square or irregular shapes, and portions of the whelk or conch shell still attached as 'unfinished' disk beads; 'finished' disk beads were identified by a roughly symmetrical circular shape and polished surfaces and edges (Figure 6.18).

Overall sizes of beads were fairly standardized across the bundles (see Figure 6.18) and range in diameter from 14.44 mm to 16.49 mm. Average thickness was less variable with a range from 4.18 mm to 4.66 mm and the average diameter of the drill holes ranged from 3.73 mm to 4.26 mm. These averages consist of measurements taken from both finished and unfinished beads and as expected, the greatest variability in average size across the bundles is in the diameter of the beads. This range accounts for measuring both finished and unfinished beads tracking the variation in size affected by the presence of a whorl or roughened edges. During the original analysis the beads were not separated by finished and unfinished categories; at the time this seemed to be an arbitrary categorical distinction not relevant to the overall assessment of the beads. Importantly, both finished and unfinished beads are included in *all* of the bundles indicating that there was no particular preference to separate 'unfinished' from 'finished' beads by Cahokians. The majority of the unfinished beads come from bundle contexts with the most number of total beads (25, 26, 27), and as expected indicate that to the persons depositing the beads and the human remains the category of 'finished' vs. 'unfinished' was not a factor affecting depositional practices. The average thickness and drill hole diameters show less variability and suggest there was a prescribed and possibly standardized method to making shell beads that included bead thickness and drill hole size. The standardized size of the drill hole also suggests that bead makers were using microdrills to perforate the disk beads, possibly from a tool kit made to a standardized size for bead making. Unfortunately, no drills were recovered from the Wilson Mound collections to test this hypothesis.

The Wilson Mound bead assemblage is one of five contexts (Powell Mound, Mound 72, Big Mound, and Cemetery Mound) where thousands of shell beads were recovered *in situ* in a ridge-top mound mortuary. Overall, the marine shell bead assemblage recovered from Wilson Mound is similar to the contexts of beads identified at the ridge-tops Mound 72, Powell Mound, Big Mound and Cemetery Mound. In all contexts human remains were buried with a series of finished and unfinished marine shell beads that included whole shell beads, disk-shaped beads, and columellae shaped beads (see Ahler and DePuydt 1987; Conant 1869; Fowler et al. 1999; Kelly 1994; Williams and Goggin 1956). In these mortuary contexts no bead making tools (microlithic assemblages) were recovered in direct context with the shell beads to suggest that individuals were crafting beads on the spot; rather the beads themselves were included in the burial context as a blanket, garment, jewelry, or piles of beads as in the case of Wilson Mound.

This is in contrast to beads and bead debitage recovered at Kunnemann Mound where Pauketat (1993: 106) hypothesizes that the materials represent "Kunnemann Tract artisans…[who] were fashioning whole necklaces." Pauketat suggests that bead making began in the Lohmann and early Stirling phases (1993: 106). This also corresponds to the Mound 72 beaded blanket burial context, which dates to the Lohmann phase (Fowler et al. 1999). Although a small sample, these established temporal affiliations of marine shell bead making and use are supported by an AMS radiocarbon date from a marine shell disk bead recovered from B.C.#3, placing this particular Wilson Mound complex within the Lohmann to Stirling phases (AD 1052-1195).

Marine shell disk bead manufacture was a standardized practice (as exemplified by the similar sizes in bead thickness and drill hole diameter across the Wilson Mound bundles); one learned by a select group of practitioners responsible for producing beads in a roughly uniform size (see Yerkes 1983). The known depositional contexts for marine shell beads include at least one cache pit and five mound contexts, as well as beads recovered from the Dunham and Ramey Tracts at Cahokia. It is important to note that shell beads do degrade fairly rapidly in American Bottom soils and the beads recovered may represent a biased sample (see Kozuch 1998; Pauketat 1993; Yerkes 1983); however, the inclusion of over 6,000 shell beads in B.C.#3 at Wilson, and over 20,000 shell beads in Mound 72, indicates that shells and shell beads were intimately tied to the dead, were intentionally curated in specialized contexts (e.g. mounds, cache pits), and warranted burial even if the beads themselves were not completely 'finished' (see Fowler et al. 1999)(see below discussion).

Shell artifacts are not unique to Cahokia and have been recovered at Mississippian sites like Etowah in Georgia, Moundville in Alabama, and Spiro in Oklahoma, not to mention small Mississippian sites throughout present-day Illinois (see Brown 2007; Lankford 2007; Reilly 2007; Williams and Goggin 1956). These shell items consist of whelk shell cups (dippers), gorgets, long-nosed god masks, and the aforementioned disk beads, tubular beads, and whole shell beads. Much of what is known about shell beads at Cahokia is derived from lithic assemblages likely used in the production of disk-shaped shell beads (Yerkes 1983; see also Mason and Perino 1961). Such assemblages include microdrills, sandstone abraders, and micro-blades as identified at the Powell Tract, Dunham Tract, Kunnemann Mound Group, Mound 34, and the Ramey Tract (Kozuch 1998; Fowler et al. 1999; Pauketat 1993; Titterington 1938; Yerkes 1983). At the Ramey Tract, partially worked and unmodified conch shells were found along with finished shell beads and gorgets indicating that conch shells were the raw material sources for disk bead production (Yerkes 1983). This is supported by evidence from Wilson Mound, as the ten recovered conch shells show signs of being worked, with distal and axial ends snapped off or ground down, and the outer whorl of the shell broken and snapped suggesting that crafts persons removed portions of the shell for making beads. Other possible shell workshops include the Powell Tract,

Tract 15-B, and a cache pit identified by Titterington located 1.6 km west of Monks Mound; this pit contained 1,960 drilled shell beads (Yerkes 1983; see also Titterington 1938).

Kozuch (1998), Yerkes (1983), and Parmalee (1958) argue that disk beads made at Cahokia are largely from marine conch shells of the sp. *Busycon* (Lightening whelks), supporting the identification of *Busycon* species of the Wilson Mound beads. These particular shells are obtained from the Gulf coasts (western side of Florida) and their presence in Illinois suggests that large quantities of these shells were traded up to Cahokia and transported at least 1,700 km (Yerkes 1983). Building on this idea of trade and exchange, Hall (1981; as cited by Yerkes 1983) argued that Cahokian bead makers also exchanged beads and crafted shell items (like gorgets and shell cups) out of Cahokia, south and east to large Mississippian mound centers like Spiro and Etowah. It is possible that Cahokian bead makers were responsible for crafting shell materials identified at other Mississippian sites creating networks and exchanging ideas much in the same way as the trade of male flint-clay figurines made at Cahokia, which have been argued to correlate to Cahokian Mississippians influence at other, smaller Mississippian sites in the southeast (Emerson et al. 2003; see also Emerson and Hughes 1999).

Classen (2011) recently explored the symbolic importance of marine shell in Mississippian archaeological contexts arguing that across the indigenous Americas (including the Aztec and the Maya of Central America) marine shell represents the underworld and the beginning and end of time, as well as birth, rejuvenation and cycles of life. In particular, such gastropods literally live in the watery underworld and provide connections to the realm of the dead and ancestors otherwise not accessible on dry land (Classen 2011: 232). The inclusion of thousands of marine shell beads and whole conch shells in mortuary contexts (specifically in Mound 72, Wilson Mound, and Powell Mound) then is not so surprising. If one takes a perspective that moves beyond economic and hierarchical models, marine shell beads become more than symbols of wealth-they become the relational ties to the ancestors. In some contexts shell beads (and whole conch shells) may have been viewed as persons, facilitating a relationship with the ancestors accessible through the creation, use, and deposition of shell items and materials.

Such an interpretation provides a more productive way to examine the inclusion of beads in mortuary contexts; additionally this perspective is more 'inline' with Native American ontology than previous trade, exchange, and hierarchical models that focus on shell beads as status symbols and markers of wealth (see Classen 2011; Hall 1997). It is more common to uncover Native American creation stories or myth-histories that focus on the activeness of materials; or more specifically that these materials are persons, they have the ability to enact change, to impact the lives of human people, and to transform spaces (see Hallowell 1960; see also Chapter 3). Rarely, do we encounter Native American histories that account for the presence of unique items like shells (or any object for that matter) as *only* markers of status and trade (see Prentice 1987); these are colonial and western interpretations that limit our understanding of Native American persons and their ontological beliefs (see Classen 2011; Hall 1997; see also Hallowell 1960; Blue Spruce and Thrasher 2008). When viewed through such a lens, then, shell beads and their intentional deposition in mortuary contexts (whether they are 'finished' or 'unfinished') cites a connection with the underworld, the ancestors, and a temporality that is circular (see Classen 2011; Lankford 2007).

Thomas (1996) citing Hammell (1983) argues that marine shell beads, their color, their relatedness to fertility (citing Hall 1989), and their use in the Southeast at contact by religious healers for curing diseases indicates that shell materials and shell beads had a variety of uses and relationships that demonstrate the power(s) of shell. It was not that the person wearing, making, or even buried with the beads was powerful or of high status, but rather the beads themselves became the sources of such powers (see Swanton 1929). The inclusion of marine shell beads and conch shells, procured from the Gulf coasts likely tied the dead and the living to another realm and to a suit of powers that became accessible through the presence of marine shell, potentially setting up passage for the ancestors across the Path of Souls into the watery underworld (see Lankford 2007; Hall 1997; see also Thomas 1996). Shell beads, as persons, facilitated the access to the underworld, as they were part of that realm and importantly created a connection among, the living, the dead, and ancestors. In the context of the Wilson Mound burials, this hypothesis considers the dynamics of relationships rather than focusing on the static role of beads as symbols of power, status and wealth (see for example Bayman 2002; Muller 1987; Prentice 1987).

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Wilson Mound was a small ridge-top similar in orientation and size to Mound 72, situated between the precincts of East St. Louis and Cahokia, and likely served to connect these two locales (see Kelly 1994; Pauketat 2013a). Previous assessments of Wilson Mound B.C. #3 focused on its unique mortuary context as a means to "eliminate the reproductive members of some honored but rival kin group"(Pauketat 2013a: 25; see also Alt and Pauketat 2007); others argued the mortuary context and mound represented an elite status group similar to those identified in Mound 72 and Powell Mound (Fowler et al. 1999; Milner 1984). Building upon these previous theories and shifting the focus away from the 'meaning' of the mound and associated remains, I consider how the practices and events that occurred at Wilson (and other ridge-tops) articulated a new way of believing and doing (see Fowles 2013) that directly impacted daily life and shaped the Cahokian landscape. The material embodiments of these 'beliefs' and 'doings' are identifiable in the method of mound construction that included layers of black gumbo clay with lighter, sandier soils, as well as the termination of buildings through fire, the filling-in of the L-shaped building with gumbo clay, and the burial of 190 disarticulated and articulated individuals buried in B.C. #3. Importantly, such actions as embodied by and in "landscape features, vital natural elements, and recurring celestial cycles" can and do shape history, identity, beliefs and practices (Janusek 2006: 474).

Preston Holder's original conclusions about Wilson Mound are helpful in thinking about the interdigitation of ridge-top mortuary practice with the natural Cahokian landscape. Holder initially concluded that Wilson Mound was a chronologically late mortuary (which we know now to be not true, see above AMS dates) of the same form as Powell Mound; however he was less concerned with the mound's temporal affiliation and more interested in how this small, seemingly isolated tumulus related to a broader understanding of Cahokian ritual mortuary practice. He often described Wilson Mound as simultaneously a tumulus, a mausoleum and a temple mound and argued that temples and tumuli are not mutually exclusive categories but rather that "the terms are too crude...and serve only to place tumuli into two categories…to further a set of preconceived ideas" (Holder personal notes, on file UMMA). His perspective on Wilson Mound reconsidered the relationship among burial mounds, practices, and the broader Cahokian context abandoning mound-type categories to consider how the "religious complex… [was] transferred to the Mississippi River Valley" (Holder personal notes, on file UMMA).

This "religious complex", in particular, was embodied in the practices and events of Wilson Mound. These include the construction and decommissioning of two pre-mound buildings, followed by the construction of the core platform mound, then the addition of a yellow-clay floor wall trench building terminated through fire, the burial of approximately 190 individuals in a single 4 m x 6 m pit on top of this building, and the final addition of the ridge-top cap. Such practices are physically and spiritually entangled with the earth, the ancestors, and powerful materials like shell and copper. These data, when considered within the context of the other four excavated ridge-tops in the Cahokian precinct, present Cahokian Mississippian death and burial as indicative of an ontology not isolated to a single mound space but experienced contemporaneously as part of a new “religious complex”, to use Holder’s words. Importantly, the newly acquired radiocarbon dates combined with the temporal affiliation of the pottery rims, shell beads, and copper covered objects support a chronological sequence that began in the TLW/early Lohmann phases and ended in the late Stirling phase (AD 983-1195). This sequence overlaps with the dates acquired for Mound 72 (AD 1050-1100) (Fowler et al. 1999: 60), Powell Mound (AD 1100-1200) (Ahler and DePuydt 1987), and what is estimated for Rattlesnake Mound (AD 1050-1100). Based on these dates, ridge-top mound construction and use occurred at multiple locations- Cahokia’s midline, southern, western, and northwestern peripheries at relatively the same time. This temporal overlap indicates that mortuary participants (both the dead and the living) and builders of the mound embodied a historical knowledge of practice and meaning that was entangled in the act of ridge-top mound construction. If this was in fact the case, it might be more useful to consider such mounds as relational spaces, part of complex religious belief and practice envisioned and enacted through the bundling of bones, and the piling up of black gumbo clay (*contra* Brown et al. 1990; Milner 1991; Porubcan 2000).

The details of Wilson Mound, as presented above, include a diversity of practices that include terminating buildings through fire, constructing mortuary space with gumbo clays, as well as the interdigitation of multiple articulated and disarticulated individuals with over 6,000 marine shell beads. It has been argued by others (see Alt and Pauketat 2007; Milner 1984) that Wilson Mound served as the burial place of a ritually/religiously killed elite kin group represented by two matriarchs, their children, and additional family members. Although this theory is not corroborated by the osteological data, yet, it is possible that the individuals buried in B.C. #3 constitute an extended family or some other group of related persons. The bundled remains (see Chapter 7) were interred in various states of decomposition and fragmentation indicating that these bones and bodies were curated prior to their deposition with over 6,000 shell beads, in B.C. #3. As I discuss in the next chapter, this method of burial is not isolated to Cahokia and has been ethnohistorically documented in the Northeastern United States as a practice and event that for the Huron occurred once every ten years (see Chapter 7). What is unique about Wilson Mound, in relation to the other ridge-tops at Cahokia, is the intimacy of this particular mortuary context; it conveys a sense of relationality between the bones, the women and their children, the earth, and the materials included with them.

In particular, the shell beads and whole conch shells buried with eight of the forty-three bundles embodies another aspect of the relational nature of Wilson Mound. These bundles exclusively consist of disarticulated remains of men, women, adults, and children. Both finished and unfinished disk beads were included in all of these bundles as well as whole conch shells, the raw material for the manufacture of these beads. The significance of the relationship between disarticulated and fragmented remains with the finished and unfinished shell beads emphasizes the powers of marine shell and also the transformation of the body/person into a spirit or an ancestor. Drawing on contexts from the Bronze Age in Europe, fragmented human remains and artifacts identified in the same contexts can be thought of "as containing traces of past places, people and events" that when combined can be transformative (Brück 2006: 311).

Marine shell, when discussed as something with transformative qualities, embodies the cyclical nature of the world; shell is also a part of the watery underworld and in Native North American ethnographic contexts was crucial to helping the dead move through the underworld and into the spirit world (see Claassen 2011; see also Hall 1997). Additionally, bodies as disarticulated, complete, or partially complete become ancestors and relational persons through the act of burial. Hall (1997) cites the practice of burying death bundles for the Menominee and argues that such burial events encouraged the soul to move on to the afterlife. The periodicity of this practice, as evidenced in the burial of multiple disarticulated individuals at once in a massive co-mingled context, may identify an extended family group coming together to bury their dead. Ridge-tops and their intricate layers of construction, buildings, materials, and human remains, in the Cahokian context, then facilitated this process of moving through the underworld into the afterlife. The locations of ridge-tops on the landscape further becomes important because these mounds mark specific directions (east and west), alignments (to the moon and the Milky Way/Path of Souls), and are literally built with the black gumbo of the underworld in watery locations (see Chapter 2). These elements all come together to facilitate the movement of the soul to the afterlife and importantly helped construct early Cahokia; this is evidenced by the chronological affiliation of Wilson Mound and its contemporaries, their respective locations on the landscape, and the temporality of mound construction and mortuary practice.

That said, I do not intend to argue that ridge-top mound building was simply a communal act where everyone shared the intimate knowledge of mound construction and burial of the dead and *ipso facto* Cahokia was created, but rather that the combination of the location of these monuments and their temporal overlap indicates that these practices were visible to the community at large, participatory, and passed down over the course of at least 100 years. Ridge-tops were active and cumulative. The knowledge of practices associated with ridge-top mounds must have been communicated to younger generations evidenced by the re-excavation and remembering of the location of previous structures, burial pits, and post pits at Mound 72 and Wilson Mound for example (see Pauketat 2008). As Pauketat (2008: 77) states:

> The new Cahokian ancestors were…remembered via the redundant and intensive depositional practices of greater Cahokia…aided by native excavations that exposed the

> apparent sedimentary truths that they or their parents or grandparents had themselves buried in the ground.

Cahokian's actively re-learned the past practices of ridge-top mound construction and use through re-visiting and re-excavating these places, further supporting the notion that ridge-top monuments were not simply one-time testaments to singular gods and goddesses but living places continuously re-animated with additional burials, deposits of material goods and the laying down of colored mound fills. Importantly, Preston Holder's detailed salvage excavations provide us with yet one more window into Cahokian mortuary practice-this unique phenomenon that came into being with the construction of Cahokia. Holder's excavations identified one more form of Cahokian mortuary practice that included the movement of bundled bodies between spaces, the curation of bundled human remains, and the burial of individuals in complex contexts (see Emerson et al. 2003; Hargrave and Hedman 2003; Fowler et al. 1999; Goldstein 2000; Milner 1982). The use of these ridge-top monuments would likely have been a multi-scalar participatory event (see Inomata 2006), one incorporating multiple persons, both dead and alive, and both active participants and onlookers. It is this participation that I assert helped build Cahokia, and where Holder's recognition of a Mississippian "religious complex" as relationally constituted by ridge-tops directs us toward a new understanding of what it means to be Cahokian.

FIGURES

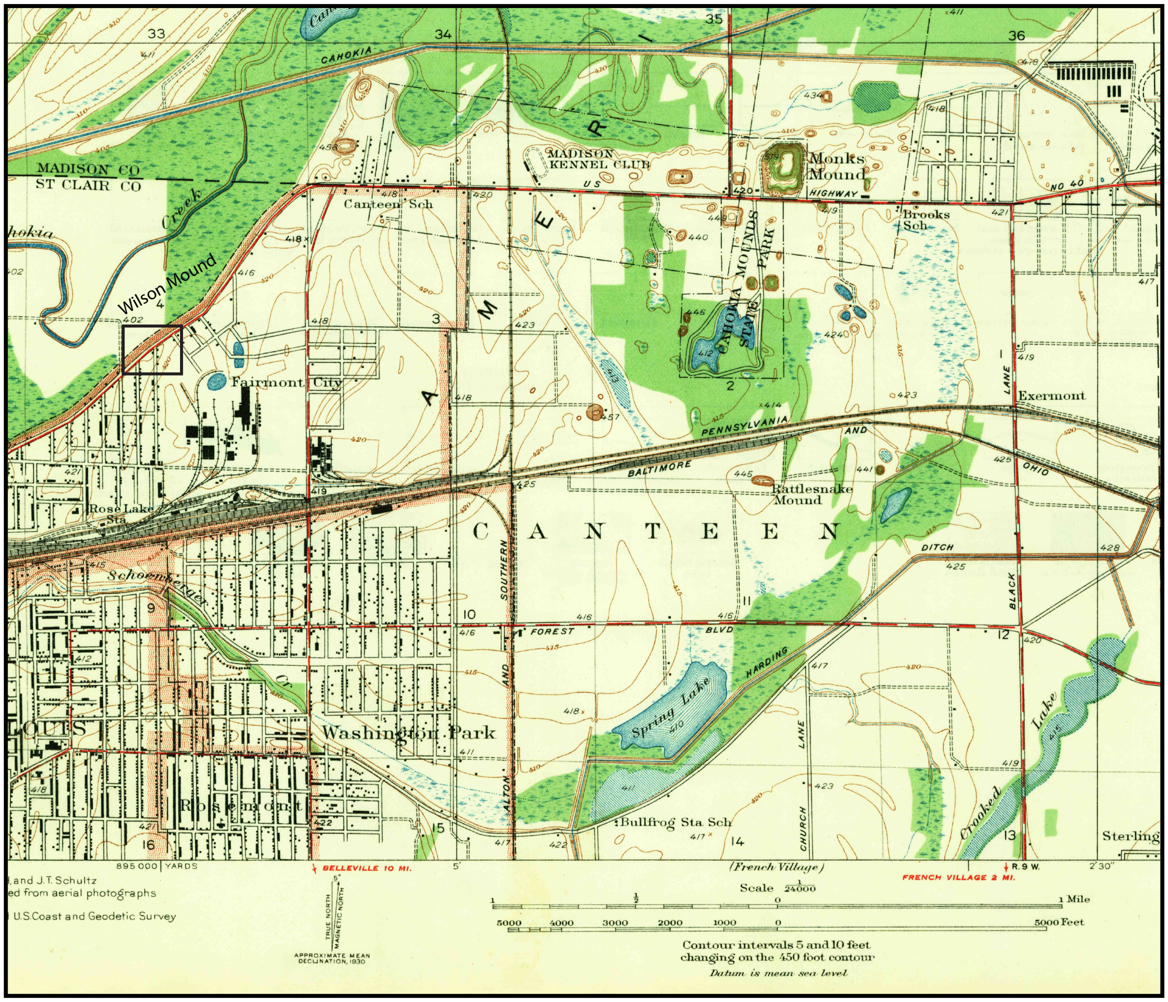


Figure 6.1 Location of Wilson Mound on 1935 USGS Topographic Survey Map prior to the excavation and destruction of the mound; also shows location of the Cahokia Precinct

Figure 6.2 Wilson Mound during 1954-1955 Holder salvage excavation, profile east to west, and view to south (photo Holder on file UMMA)

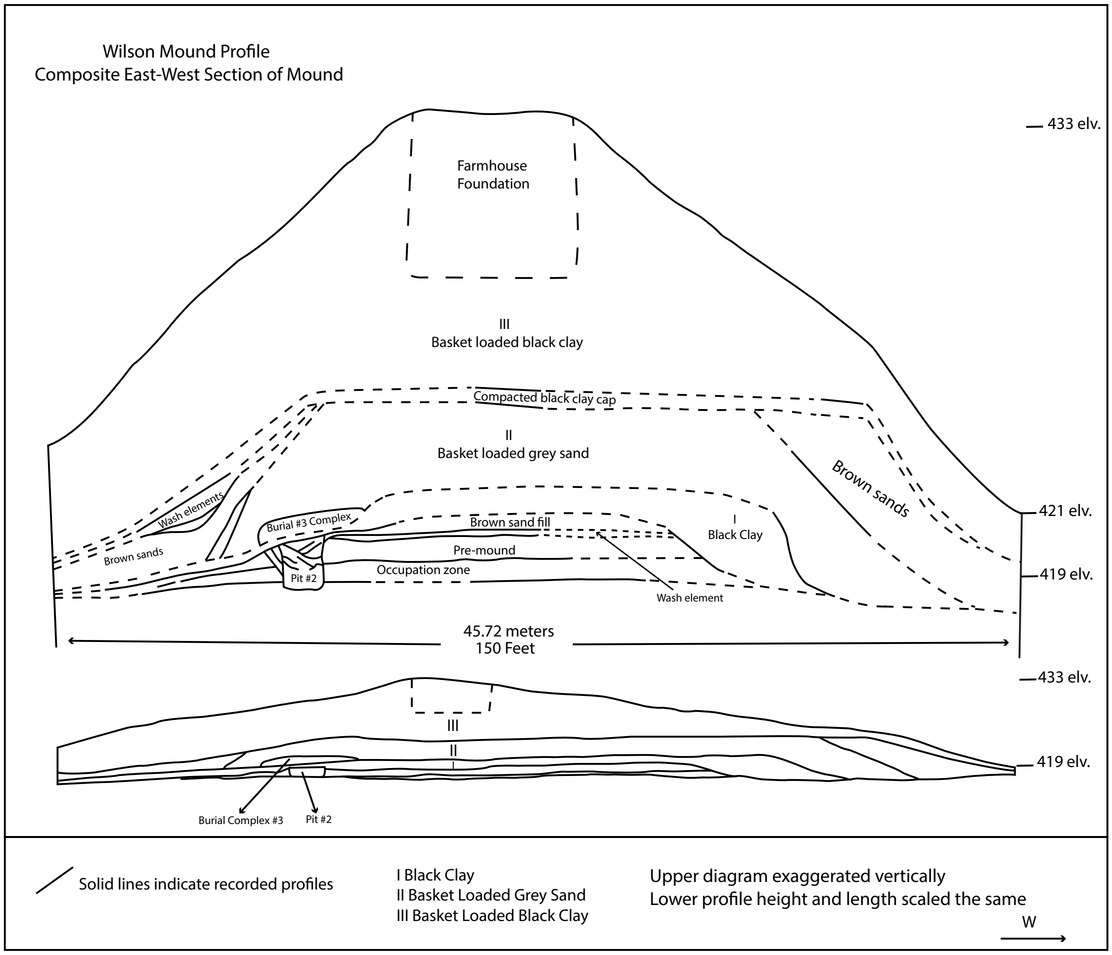


Figure 6.3 Wilson Mound Profile view to south; the upper profile is exaggerated vertically, in the lower profile height and length are scaled the same (after Holder, notes on file UMMA)

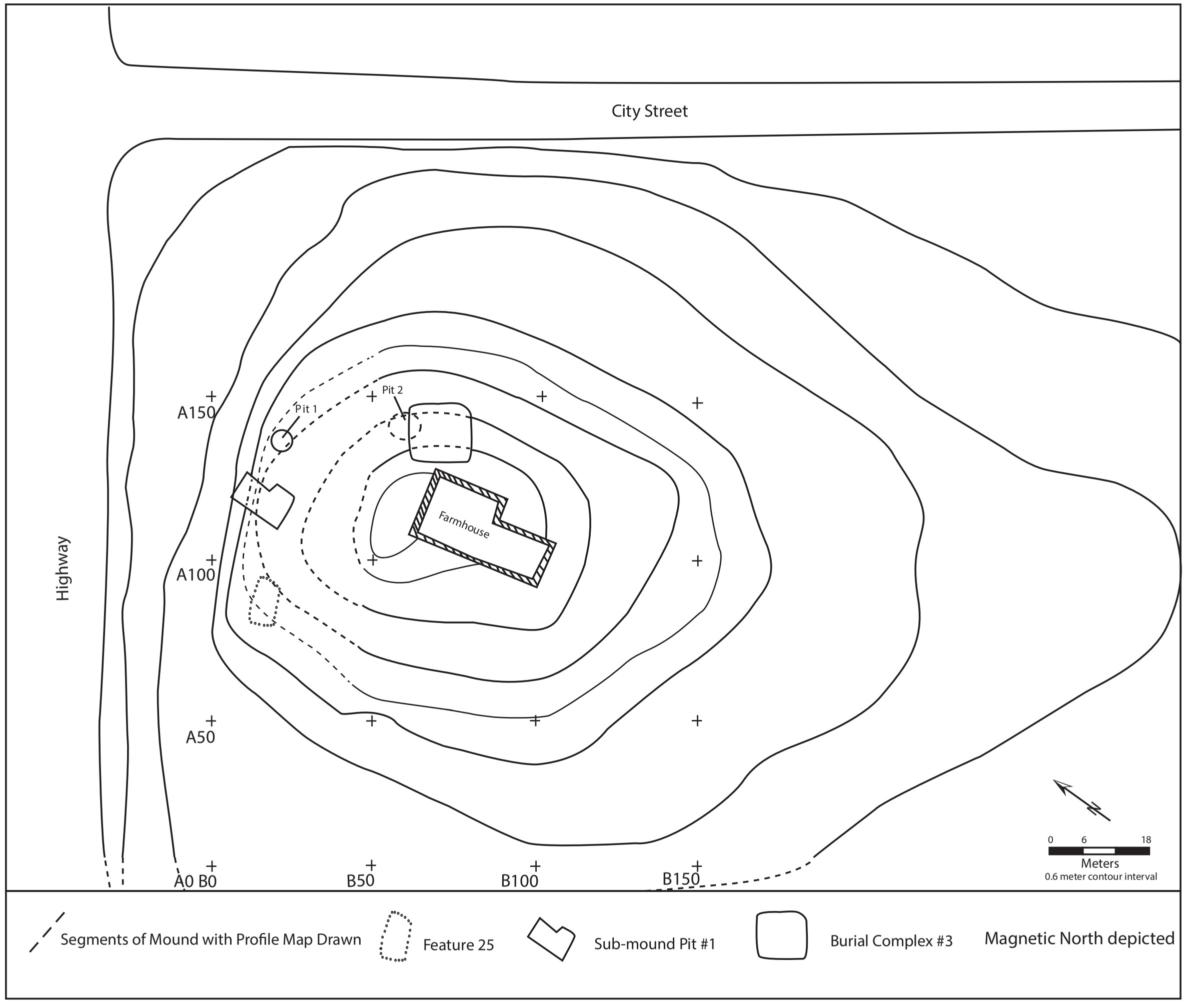


Figure 6.4 Wilson Mound Plan Map showing A/B grid system and location of features (re-drawn from Holder, notes on file UMMA)

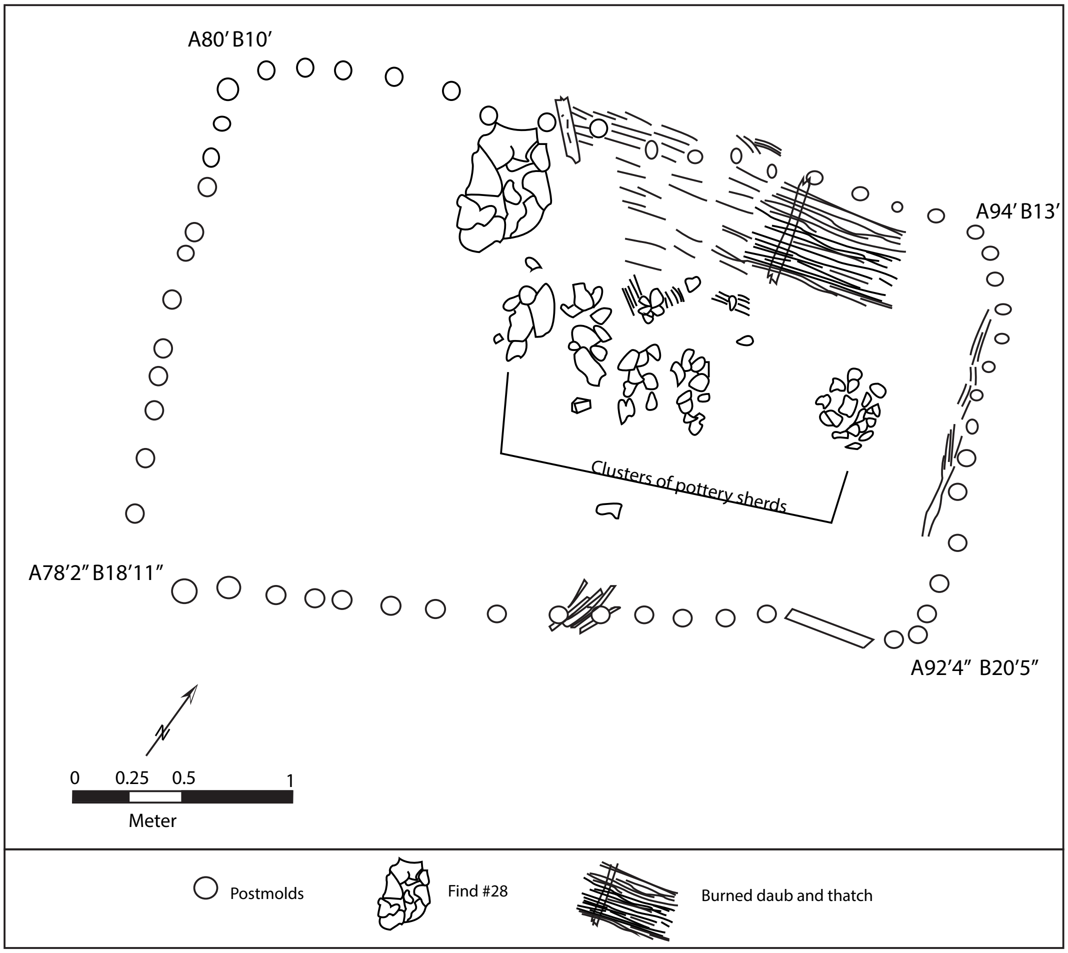


Figure 6.5 Feature 25 plan showing location of Find #28/#33, burned thatch and daub (after Holder, notes on file UMMA)

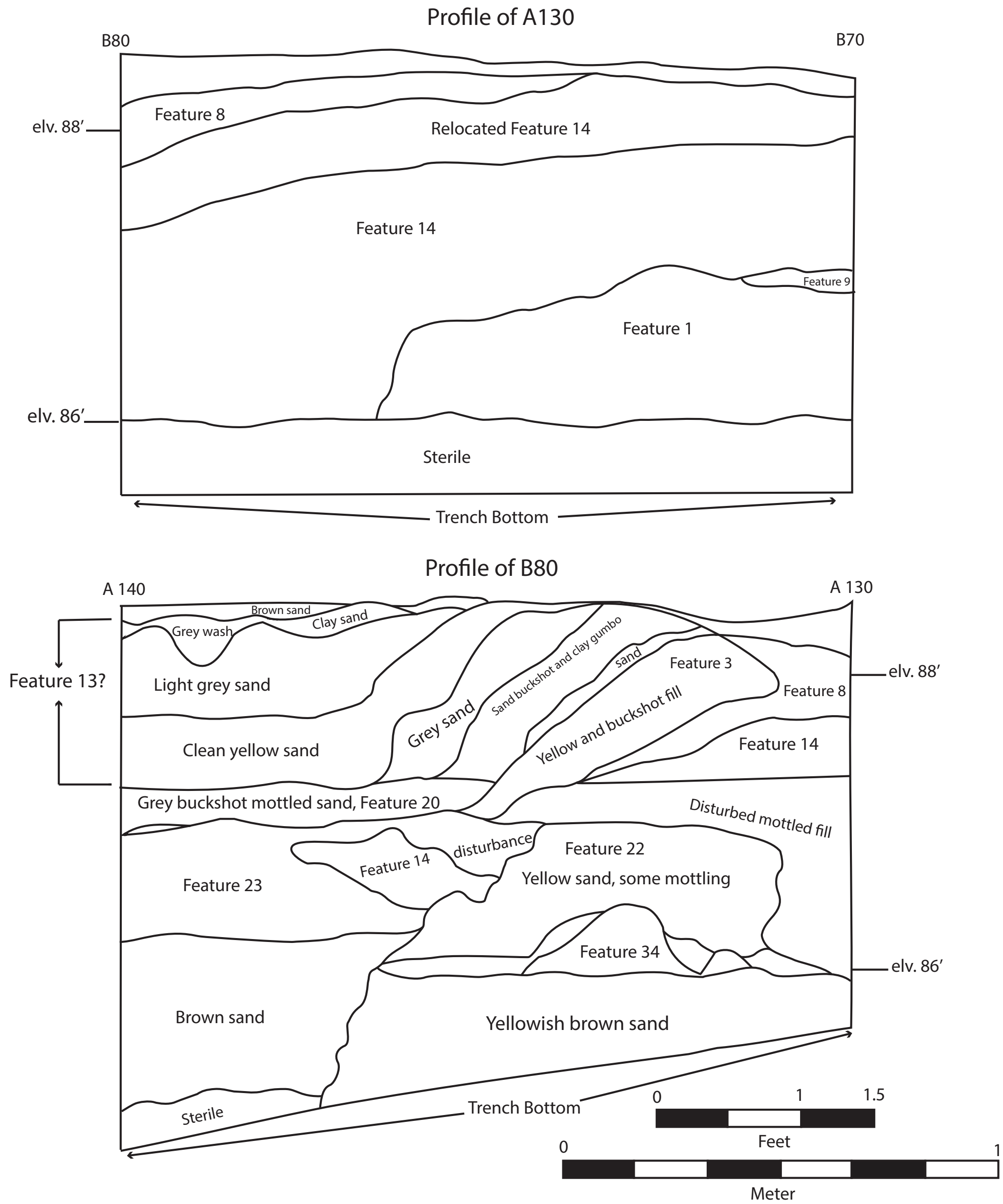


Figure 6.6 Wilson Mound Profiles along grid lines B_{80} and $A_{130,}$ in feet and meters (after Holder, notes on file UMMA)

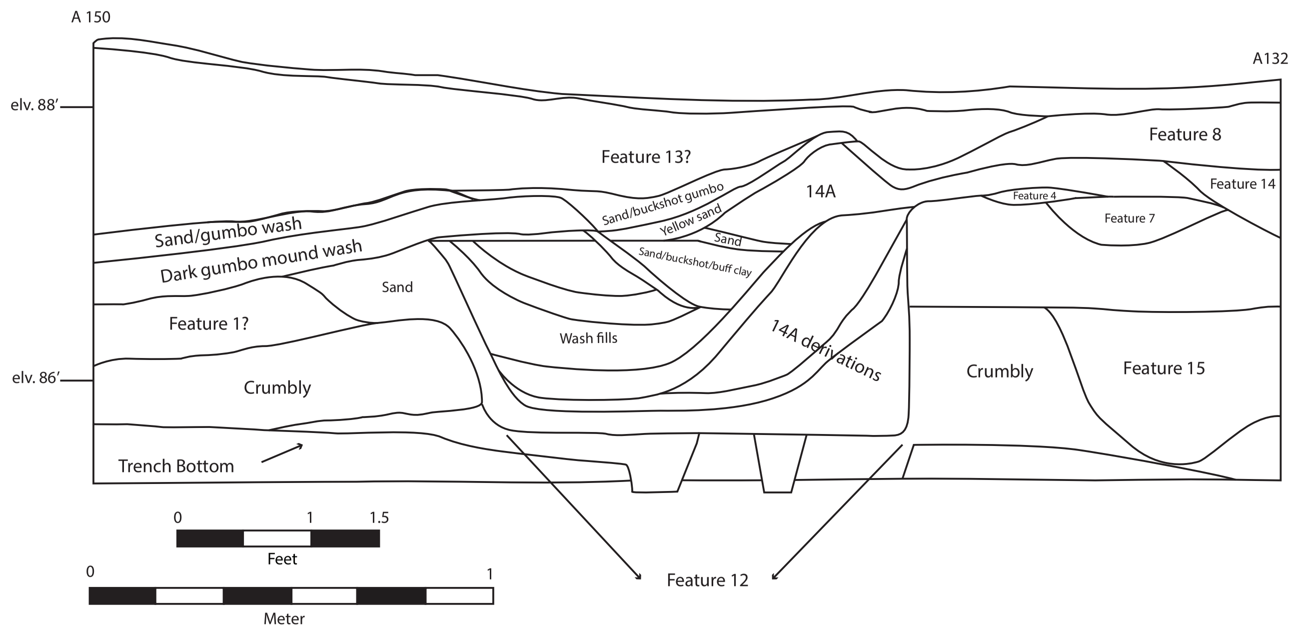
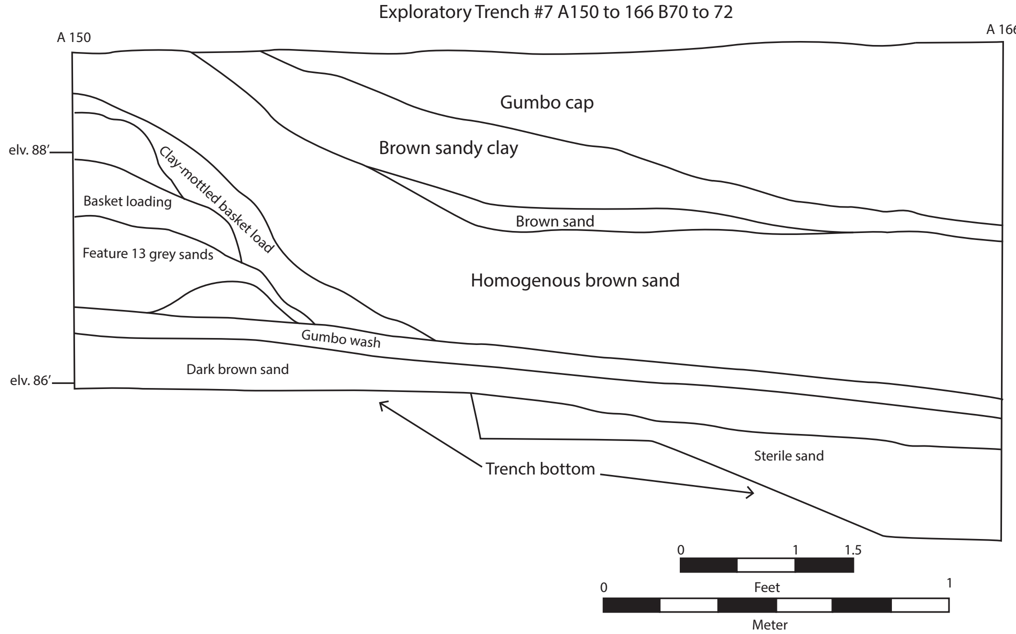


Figure 6.7 Wilson Mound Profile, Feature 12 in feet and meters (after Holder, notes on file UMMA)



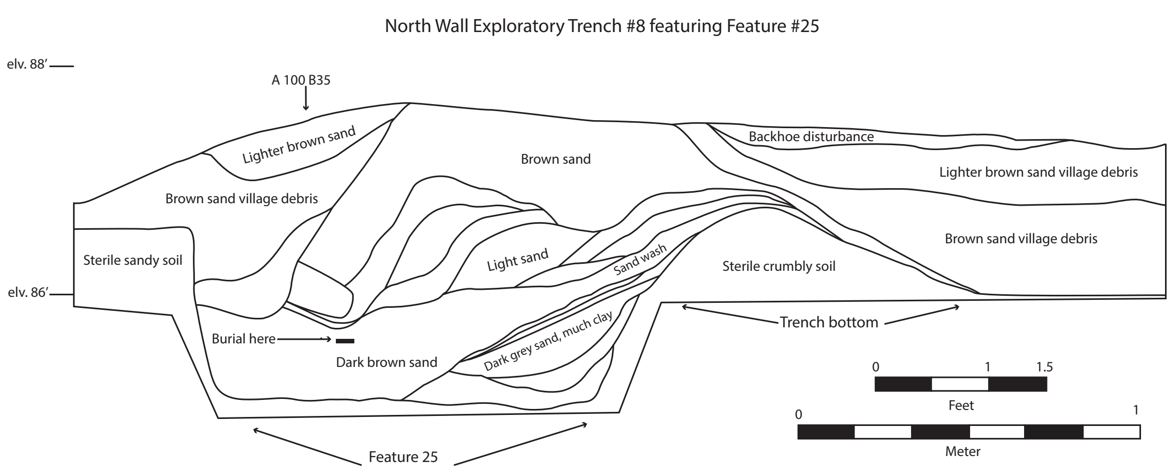


Figure 6.8 Wilson Mound Exploratory Trenches #7 and #8 depicting Feature 25, in feet and meters (after Holder, notes on file UMMA)

Figure 6.9 Find #28/#33 *in situ*, Feature 25, Find #28/#33 reconstructed (Holder, photographs used with permission UMMA)

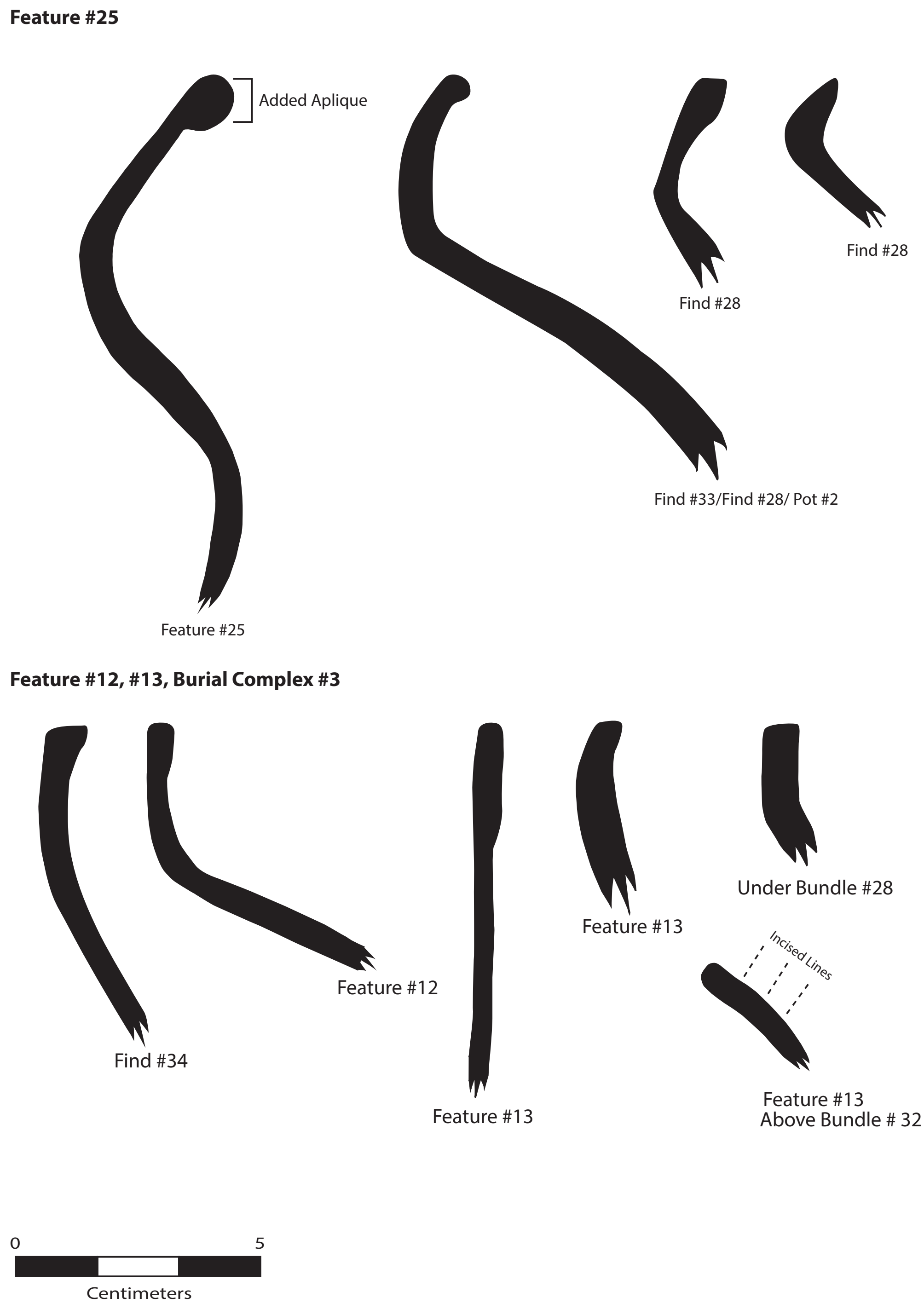


Figure 6.10 Wilson Mound Pottery rim profiles organized by feature number

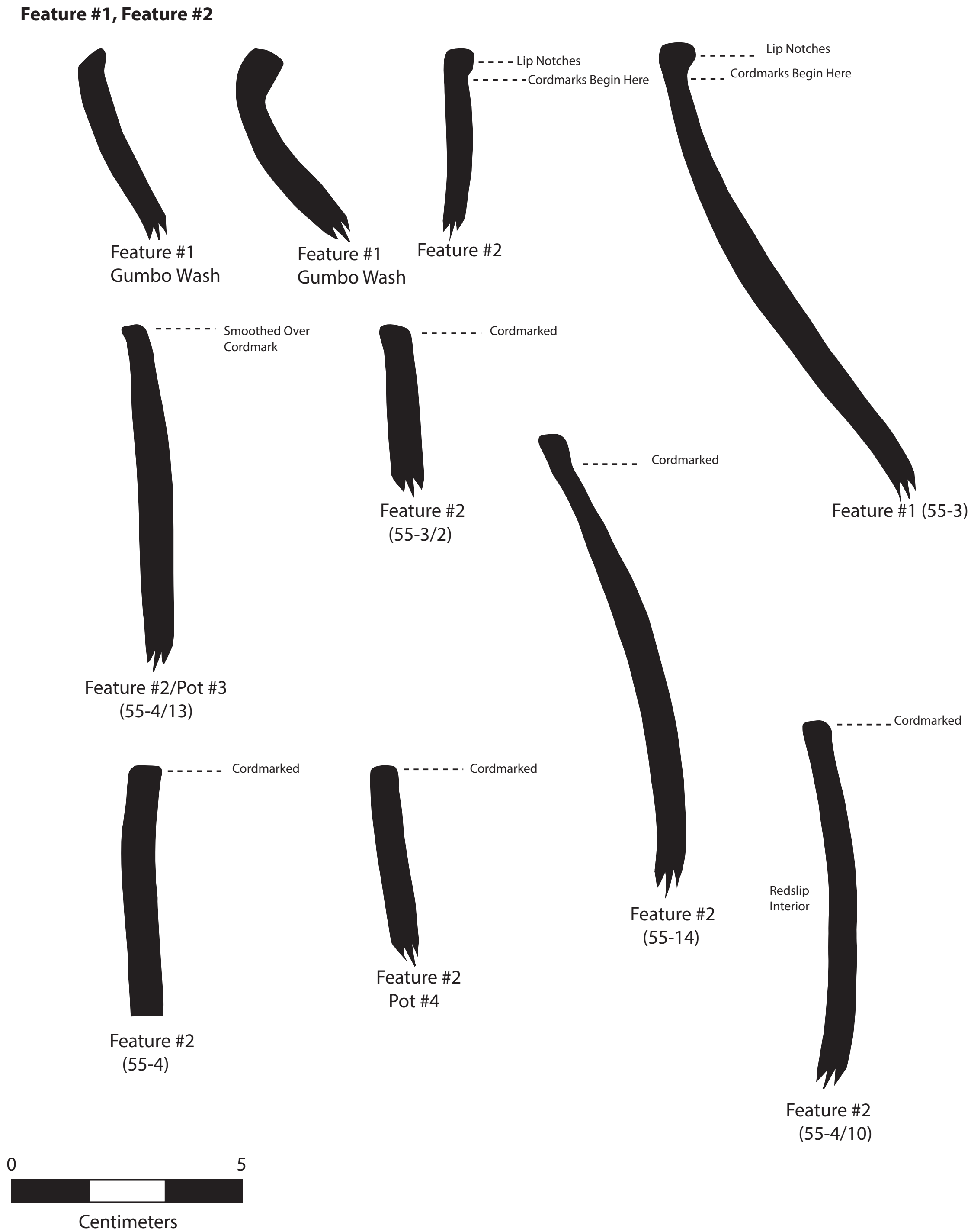


Figure 6.10 continued

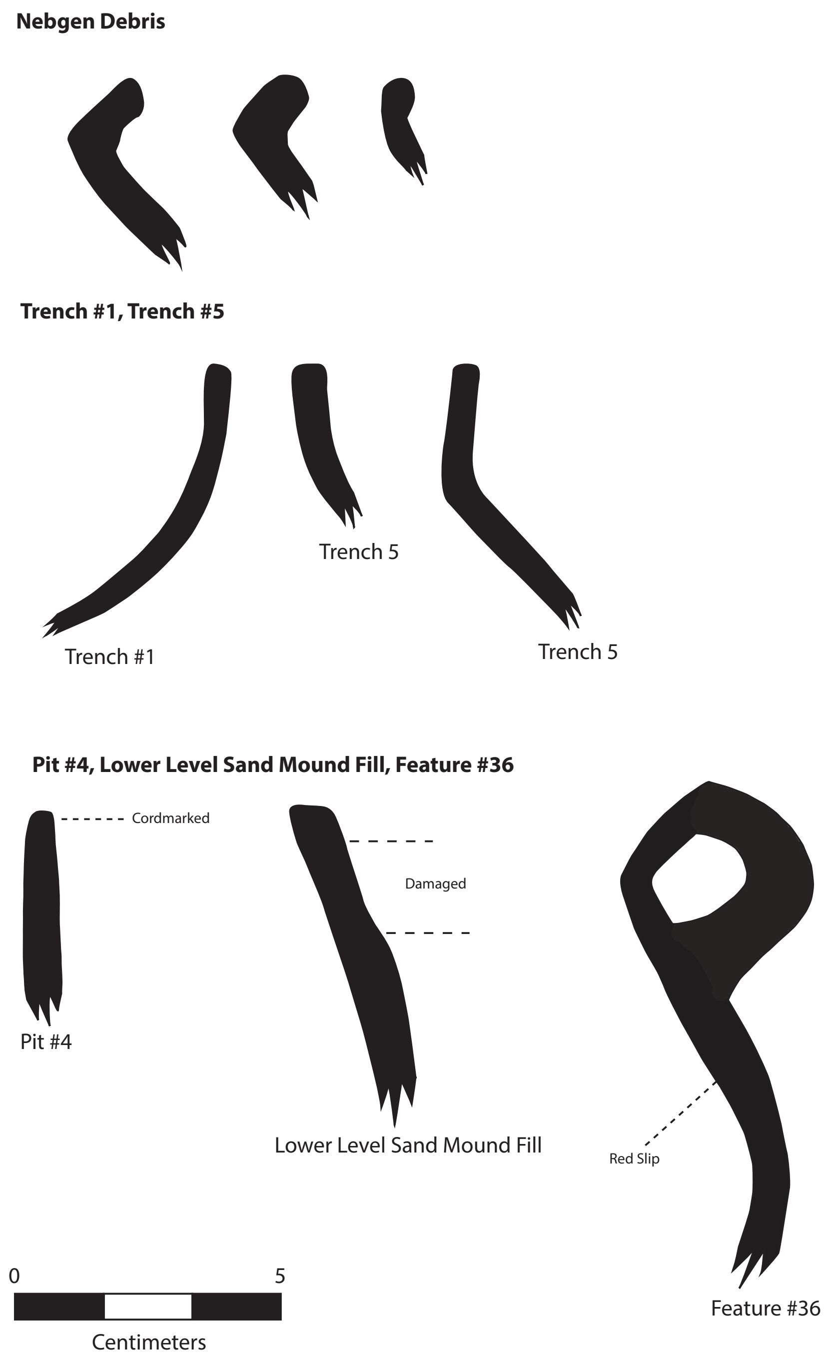


Figure 6.10 continued

Figure 6.11 ‘Spur-handled cup (bean pot)’ Beaker, recovered from Burial Complex #3, both images documenting the same beaker (Holder, photographs used with permission UMMA)

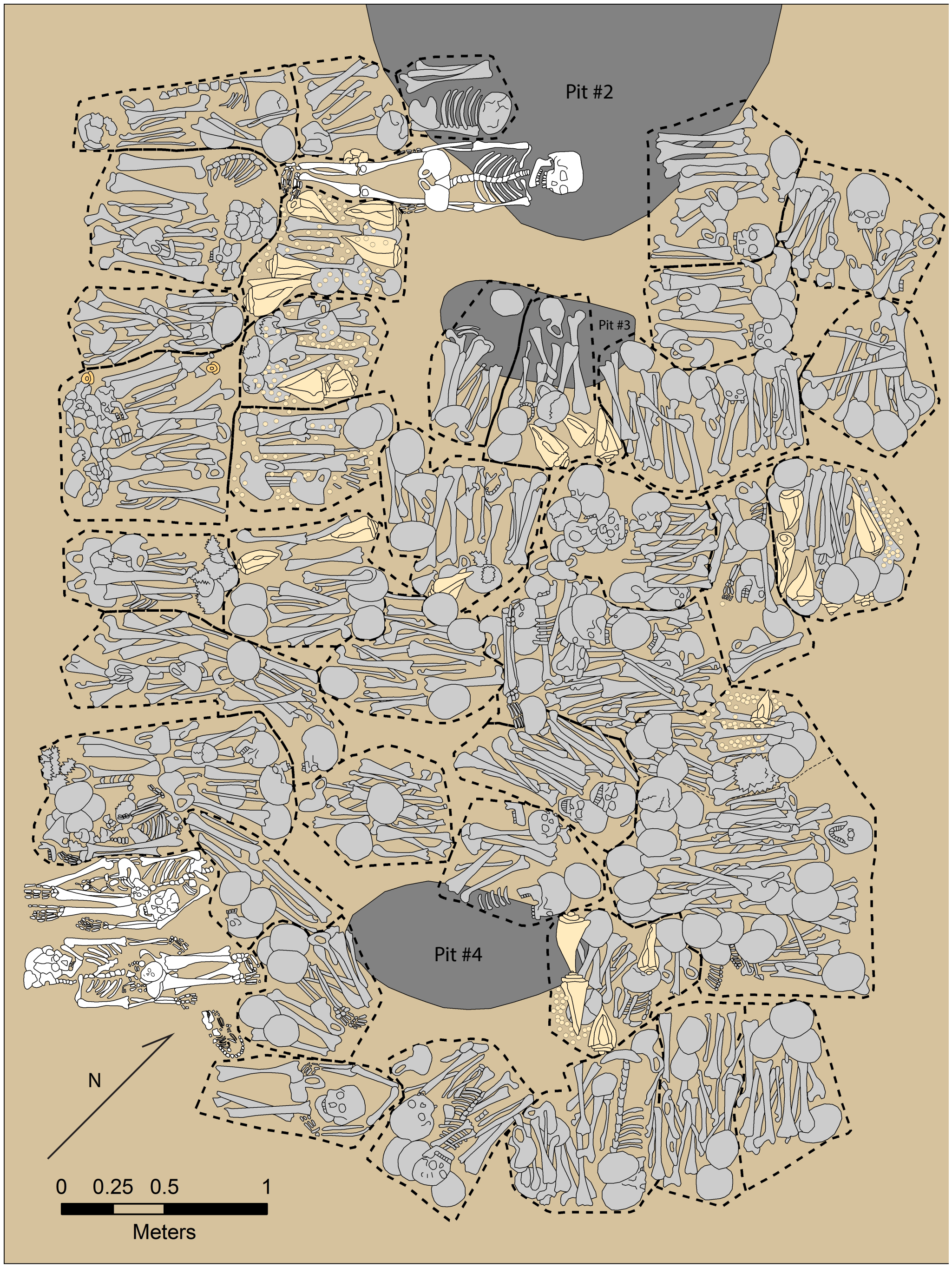


Figure 6.12 Burial Complex #3 Plan Map, white skeletons identify three primary female burials, yellow identifies whole conch shells and shell beads, dark grey indicates sub-burial pit features (re-drawn from Holder, notes on file UMMA)

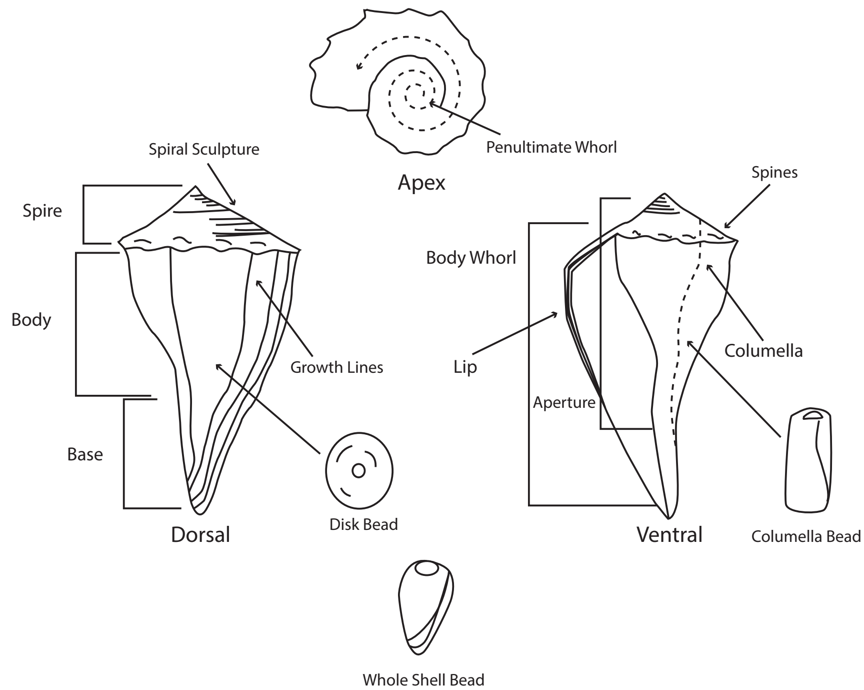


Figure 6.13 *Busycon sinistrum* (Lightening Whelk) showing structure of whole shell, shell bead types (disk, columellae, and whole shell) and the area of the shell used for bead manufacture

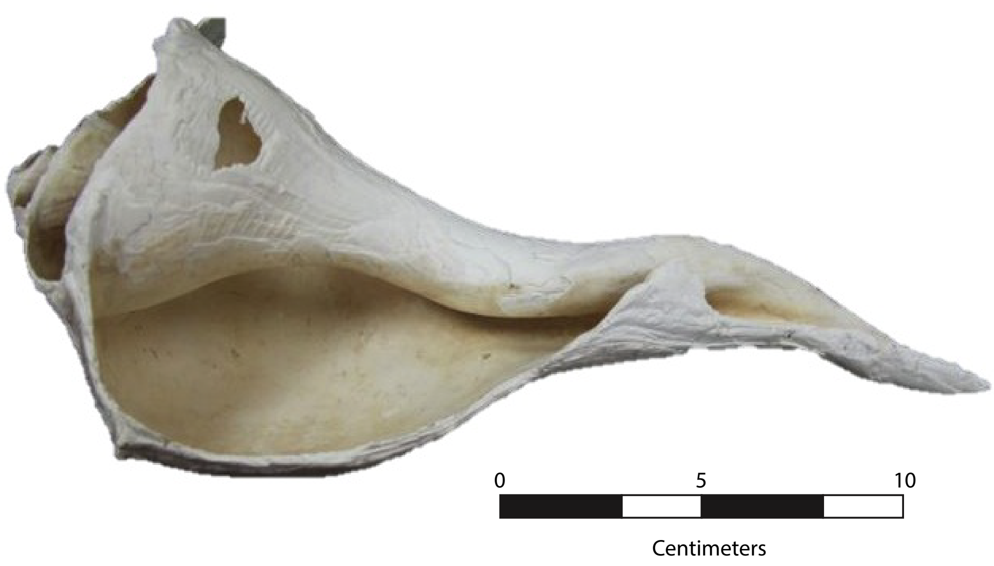


Figure 6.14 Worked ventral surface of *Busycon sinistrum* (Lightening Whelk) from Burial Complex #3, Wilson Mound (curated with Illinois State Museum)

Figure 6.15 Unfinished whelk shell disk beads with spines not ground down (top, row 1), finished shell disk beads (row 2), whole shell beads (row 3), finished shell disk beads (row 4), Burial Complex #3, Wilson Mound

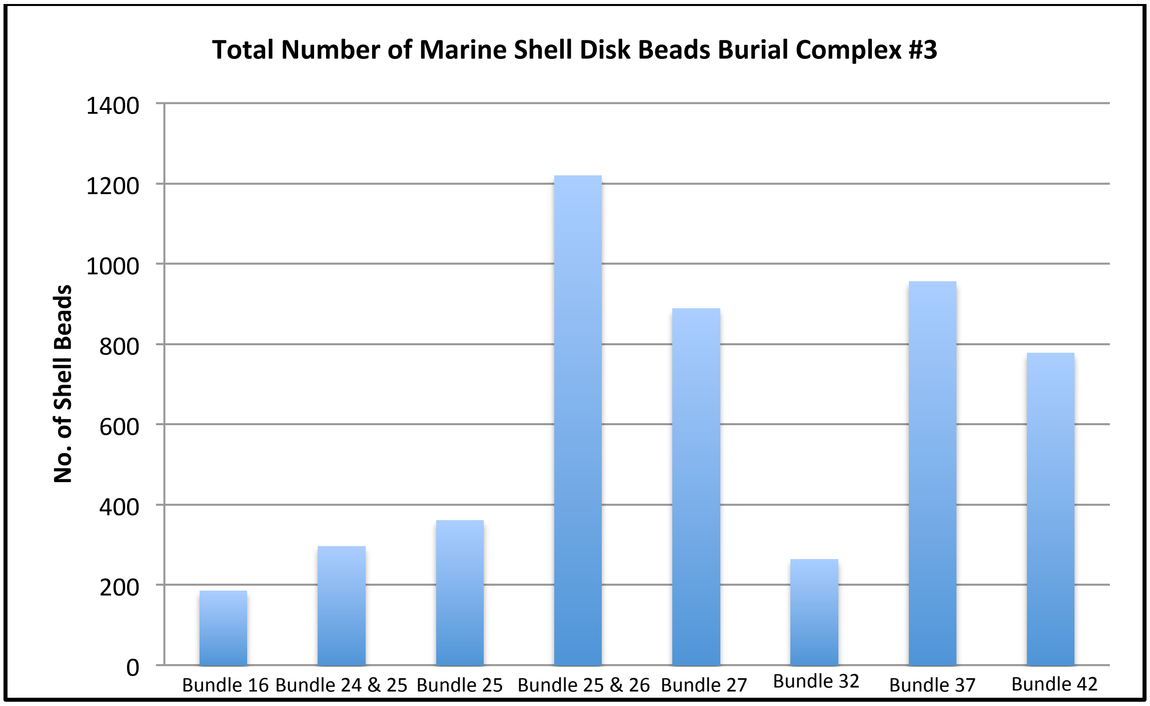


Figure 6.16 Total Number of Marine Shell Disk Beads, Burial Complex #3

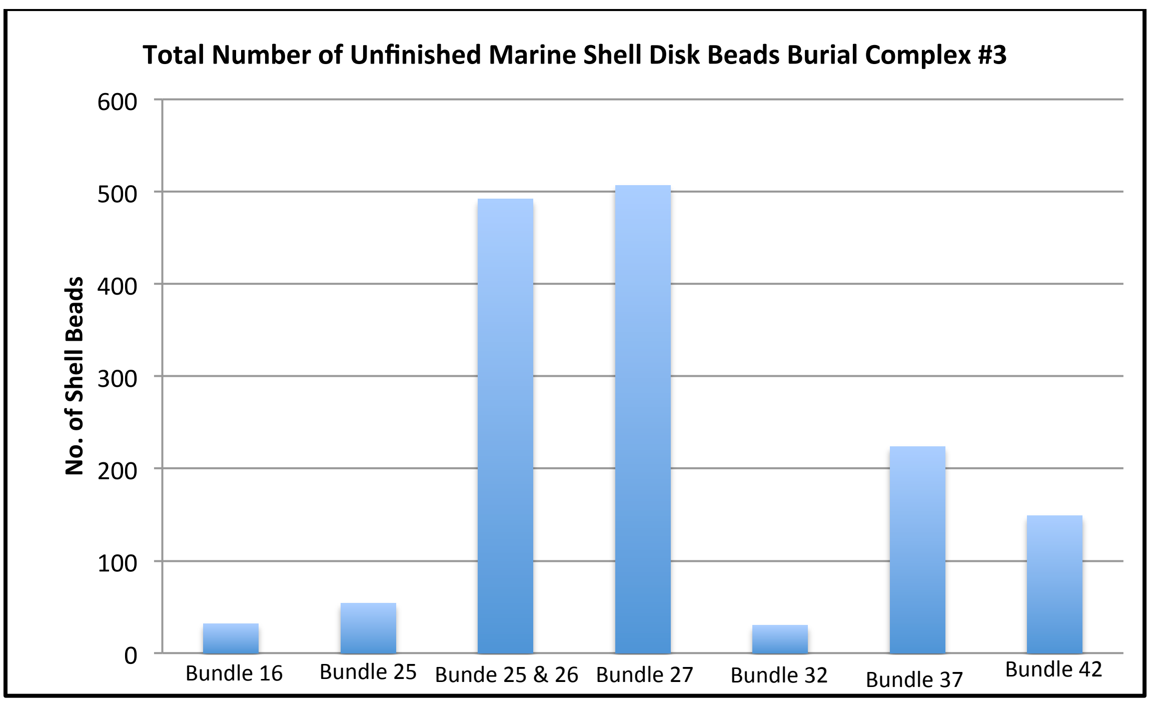


Figure 6.17 Total Number of Unfinished Marine Shell Disk Beads, Burial Complex #3

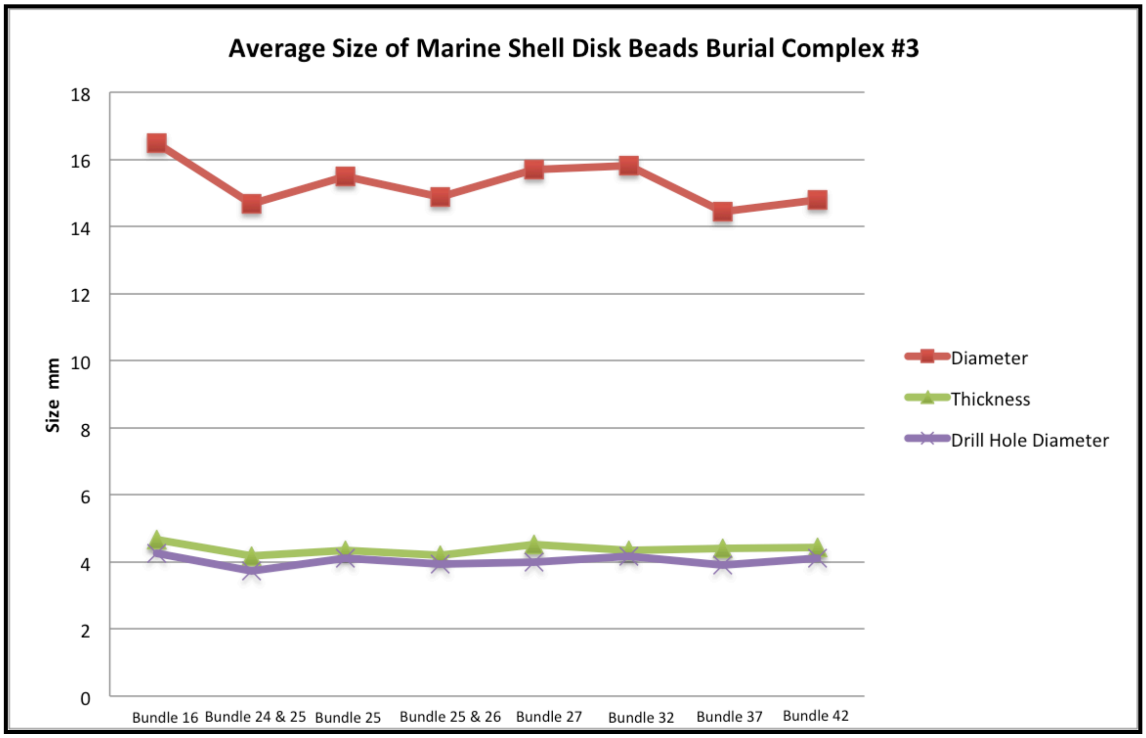


Figure 6.18 Average Size of Marine Shell Disk Beads, Burial Complex #3

Figure 6.19 Bone Ear Spools Wilson Mound, Burial Complex #3, Primary Burial #1 (curated with Cahokia Mounds State Historic Site)

TABLES

Find	Description	Location
Find 1	Woodland pot: base, rim, sherds	$A_{130}B_{40}$
Find 2	Stone nodules, flint, sandstone	$A_{136}B_{76}$ Elv. 88'
Find 3	Sherd, Monks Mound Red?	Assoc. B.C. #3, Prim. #1, $A_{133}B_{84'2''}$
Find 4	Snubnosed flake	Frt. 2, level 2
Find 6	Cordmarked sherd	-
Find 7	Sandstone	Trch. 1
Find 8	Sandstone	Trch. 1
Find 9	6 large cordmarked sherds, nested in Ftr. 1, Woodland occupation	$A_{183}B_{32'6''}$ Elv. 86'2"
Find 10	Rim and shoulder, redslipped glubular Miss. Pot	$A_{132'6''}B_{50}$ (III) gumbo mound cap
Find 11	Sherd, brown plain ware	Burial #4, submound pit #1
Find 12	Charred beam	B.C. #3, $A_{131}B_{76}$
Find 13	Charred matting	Trch. 5
Find 14	Cordmarked sherd	Ftr. 8
Find 15	Cordmarked sherd	Ftr. 2/14 under Ftr. 8, $A_{130}B_{72'2''}$ Elv. 86'11"
Find 16	Charred bark	Ftr. 8
Find 17	Grey ware sherd	B.C. #3, Prim. #1, Elv. 87'10"
Find 18	Earspool, copper fragments	B.C. #3, Prim. #1 inside mandible
Find 19	2 cordmarked sherds in gumbo layer	Ftr. 8, below B.C. #3
Find 20	Hematite chunk	B.C. #3, Prim. #1, Elv. 87'
Find 21	-	-
Find 22	-	-
Find 23	-	-
Find 24	Flint nodule	near Skull #3, Bundle #3, B.C. #3
Find 25	Ovate charred seed (bean?)	$A_{137'4''}B_{78}$ Elv. 87'4"
Find 26	Half of a pot	Ftr. 12
Find 27	-	-
Find 28	Pottery fragments with corn debris	Ftr. 25
Find 29	Grouping of pottery sherds, hematite	$A_{155}B_{15}$
Find 30	6"x9" piece of burned thatch (cat tails?)	Ftr. 25, $A_{83'10''}B_{17'10''}$
Find 31	Charred grass, corn, seeds, pot section	Ftr. 25, northeasterly corner
Find 32	Burned cane and grass	Ftr. 25, $A_{87}B_{19}$ Elv. 86'
Find 33	2 collapsed pots	Ftr. 25?
Find 34	1 Powell Polished Plain sherd	edge of Ftr. 12
Find 35	Grouping of Powell Polished Plain sherds	under gumbo layer, on top of sand layer Elv. 87'
Find 36	Artifacts	Ftr. 12
Find 37	2 Mississippian sherds	Profile $A_{156}B_{60}$ Elv. 87'
Find 38	1 Red Slipped sherd	Ftr. 27
Find 39	-	-
Find 40	Corn cob	on top of gumbo wash
Find 41	Discoidal	Bundle #29, B.C. #3, under distal end of tibia below most northernly skull

'-' no data recorded

Descriptions taken from Holder's Field Book 1&2 (27-30; 70-72)

Table 6.1 Wilson Mound Artifact 'Find' Descriptions

Feature	Description	Location	Calibrated C14 Date
Feature 1	dark, greasy layer of clay-loam with organic material, rim sherds of Woodland pot, Woodland occupation surface	$A_{110-140}$ to B_{25-30}	-
Submound Pit # 1	in Feature 1, burial pit dug then filled in with organic material	-	-
Feature 2	bell-shaped pit with sherds in the bootom, shiny black, greasy sand fill, charcoal bits, ochre, yellow sand marks bottom of pit	-	-
Feature 3	organic fleck yellow brown clay, may be wall trench?	$A_{130}B_{80}$	-
Feature 4	pocket of water laid sand east of B.C. # 3	-	-
Feature 5	buckshot clay mottled east of B.C # 3	-	-
Feature 6	gumbo fill matrix around B.C. # 3	-	-
Feature 7	gumbo cap above B.C # 3	-	-
Feature 8	gumbo trench west of B.C. # 3, small mound with gumbo core covered with clay and gumbo mixture, at 86' elv., dips under gumbo layer which B.C.3 is buried in	-	-
Feature 9	layer of clean yellow sand about 1" thick, unlerlies gumbo cap and one of the first loading elements of mound construction	-	-
Feature 10	submound wall-trench	-	-
Feature 11	basin shaped depression 3' diameter let into submound sand	-	-
Feature 12	wall-trench underneath B.C. # 3	B_{60}	cal AD 982-1052
Feature 13	basket laid sand matrix around B.C. # 3, combines Features 3 and 5	-	-
Feature 14	a structural component under Feature 8 and above Feature 9, dark clay soil with buckshot elements of buff clay	A_{130} to B_{70}	-
Feature 15	shallow 'basin' of sandy fill cutting into Feature 1	-	-
Feature 16	rodent burrow	-	-
Feature 17	gumbo and mottled grey clay-sand fill in dark grey sand matrix surrounding Bundle # 3 of B.C. # 3	-	-
Feature 18	line of post molds	$A_{130-140}$ to B_{50-60}	-
Feature 19	some sort of trench-like structure detail, may be related to Feature 12	$A_{136-146}$	-
Feature 20	grey buckshot mottled sand layer horizontal above Feature 19	-	-
Feature 21	horizontal lens with charcoal, predates digging of Feature 19 and Feature 1, 86' elv.	-	-
Feature 22	a humped layer of yellow sand related to digging of Feature 19	$A_{130-135}$ to B_{80}	-
Feature 23	a relative of Feature 14, dark brown greasy sand	$A_{136-140}$ to B_{80}	-
Feature 24	a relative of Feature 14	$A_{152-154}$ to B_{80}	-
Feature 25	burned wall-trench submound building	-	cal AD 975-1026
Feature 27	secondary refuse pit 5' deep 3' wide	-	-
Feature 29	pit feature possibly related to Feature 27	-	-
Burial Complex #3	43 bundle burials	-	ca AD 1052-1195

'-' Data not recorded

Descriptions taken from Holder Field Books 1 (21-26)

Table 6.2 Wilson Mound Feature Descriptions

Construction Phase			
1) Woodland Occupation	*2) Early Mississippian Occupation*	*3) 1st Mound Building Stage*	*4) 2nd Mound Building Stage*
Feature 1	Feature 25	Brown sandy fill	(III) Basket Loaded Black Clay
Feature 2	Feature 18	Pit 2/Feature 2	
Feature 10	Feature 19	(I)Black clay	
Submound Pit/L-Shaped Pit	Hearth	Burial Complex #3	
Feature 14	Feature 14	(II) Basket Loaded Sand	
		Compacted Black Clay Cap	

I, II, III correspond to designations on profile map, Figure 5.2

Table 6.3 Wilson Mound Occupation and Construction Phases

Temper	Find #2		Find # 19		Find #20		Find #21		Find #28		Find #29		Find #33, Pot 1		Find #33, Pot 2		Find #34		Find #35		Find #36		Find #40	
Surface	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)
Shell																								
CM											2	9									2	27.9		
RS											15	31.3			72^	563.8								
DS											83	403.3	70	598.4			1	6.6			8	80.3		
PL	3	36.9							91	416.6											3	166		
Other																			4*	8.2				
Limestone																								
CM																								
RS																								
DS																								
PL																								
Grog																								
CM					4	9.3					2	16.7												
RS																								
DS																								
PL							1	3.1	15	278.9	2	6.7												
Grit																								
CM			2	24.4																				
RS																								
DS																								
PL																								
Grit/Grog																								
CM					2	0.7																		
RS																								
DS																								
PL																								
Red Ochre							2	0.7																
Daub																								
Ceramic Disk																								

^ Red slipped interior
* Powell Plain
+ Incised
CM (cordmarked), RS (red slipped), DS (dark slipped), PL (plain)

Table 6.4 Wilson Mound Body Sherds, Find #'s

Temper / *Surface*	Above B.C. #3 no.	Above B.C. #3 wt. (g)	B.C. #3 no.	B.C. #3 wt. (g)	Bundle #20 no.	Bundle #20 wt. (g)	Bundle #30 no.	Bundle #30 wt. (g)	Bundle # 32 no.	Bundle # 32 wt. (g)	Primary #2 no.	Primary #2 wt. (g)
Shell												
CM												
RS												
DS												
PL											1	33.3
Other							1+	1.31				
Limestone												
CM												
RS												
DS	1	1.8										
PL												
Grog												
CM									1	14.2		
RS												
DS												
PL			1	1.8	2	25.5						
Grit												
CM												
RS												
DS												
PL												
Grit/Grog												
CM												
RS												
DS												
PL												

^ Red slipped interior
* Powell Plain
+ Incised
CM (cordmarked), RS (red slipped), DS (dark slipped), PL (plain)

Table 6.5 Wilson Mound Body Sherds, from Burial Context

Temper	Trench 1		Trench 2, Pit 1		Trench 2		Trench 4		Trench 5		Area A		Surface		Basket Laid Sand		Primary Mound Profile		General Fill	
Surface	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)
Shell																				
CM													1	11.7						
RS									2	5	6	4.9					1	27	1	0.6
DS			2	24.9			3	45.4	3	8.8										
PL					3	5.7			2	7.3	5	9.2	4	10.4						
Other																				
Limestone																				
CM																				
RS									2	7.1										
DS																				
PL											1	6.2								
Grog																				
CM	1	7.7	1	4	4	54			1	3.9			5	65.9	2	10.5			9	28.6
RS																				
DS																				
PL											2	13.9	5	4.4						
Grit																				
CM					2	19.5							10	69.4						
RS																				
DS																				
PL																				
Grit/Grog																				
CM	5	25																		
RS																				
DS																				
PL																				
Red Ochre																				
Daub																				
Ceramic Disk													1	10.2						

^ Red slipped interior
* Powell Plain
+ Incised
CM (cordmarked), RS (red slipped), DS (dark slipped), PL (plain)

Table 6.6 Wilson Mound Body Sherds, from Mound Context

Temper	Surface	Ftr. 1 no.	Ftr. 1 wt. (g)	Ftr. 3 no.	Ftr. 3 wt. (g)	Ftr. 11 no.	Ftr. 11 wt. (g)	Ftr. 12 no.	Ftr. 12 wt. (g)	Ftr. 13 no.	Ftr. 13 wt. (g)	Ftr. 14 no.	Ftr. 14 wt. (g)	Ftr. 25 no.	Ftr. 25 wt. (g)	Ftr. 27 no.	Ftr. 27 wt. (g)
Shell																	
	CM	2	26			1	9.6	1	4.5								
	RS							18	210.5								
	DS							11	72.2	7	48.9						
	PL	3	70.7					40	173.2	12	65.5	6	40.5	80	326.8	1	1.9
	Other									3*	3.6						
Limestone																	
	CM																
	RS	1	4.1			1	1.9			1	3.7	2	4.9				
	DS	2	7.6														
	PL																
Grog																	
	CM	19	160.46					4	13.5			4	9.8	3	7.3		
	RS									1	0.9						
	DS					1	2.6										
	PL	1	3.3					3	63.2	2	5.4	1	5.6	1	5.1		
Grit																	
	CM																
	RS																
	DS	1	5.2														
	PL																
Grit/Grog																	
	CM			1	17.1												
	RS																
	DS																
	PL																
Red Ochre																	
Daub								5	47.4								
Ceramic Disk																	

^ Red slipped interior
* Powell Plain
+ Incised
CM (cordmarked), RS (red slipped), DS (dark slipped), PL (plain)

Table 6.7 Wilson Mound Body Sherds, from Feature Contexts

Provenience										
Bag Information	*Holder Notes*	**Orifice Diameter (cm)**	**Wall Thickness (WT)**	**Lip Length (LL)**	**Lip Index (WT/LL)**	**Vessel Type**	**Temper**	**Component**	**Treatment**	**Comments**
Find #33, Pot 2	Ftr. 25	18	0.5	0.93	0.54	Jar	Shell/Grog	Lohmann	DS ext., RS int.	
Prim. Burial #3	-	16	0.9	-	-	Jar	Shell	Lohmann?	E ext., RS int.	6% of orifice present
Prim. Burial #3	-	10 ± 2	0.64	0.68	0.94	Jar	Shell	Lohmann	DS B etx., RS lip int., P int.	5% of orifice present
Find #28	Ftr. 25	14	0.41	2.58	0.16	Jar	Shell	Late Stirling	E ext., E int.	
Find #28	Ftr. 25	12 ± 2	0.53	0.46	1.15	Jar	Limestone	Early Lohmann	E DS ext., DS int.	5% of orifice present
Find #28	Ftr. 25	22	0.81	0.76	1.06	Jar	Shell	Lohmann	E ext., RS lip int., E RS int.	7% of orifice present
Find #34	Ftr. 12	16	0.56	0.62	0.9	Jar	Shell	Lohmann	DS B ext., DS int.	
Trench 5	-	20	0.58	-	-	Jar	Shell/Grog	Lohmann	E RS? ext., E DS int.	<5% of orifice present
Trench 5	-	18	0.59	-	-	Bottle	Shell	?	E ext., P int.	
Surface	-	32	0.42	0.46	0.91	Jar	Grit	L.W.	CM Z twist ext., E int.	<5% of orifice present
Find 22	-	10	0.39	0.99	0.39	Jar	Grog	L.W.	E ext., LN, E int.	
Lower Levels Sand Mound Fill	-	16	-	-	-	Bowl?	Grit/Grog	L.W.?	CM S twist ext., E int.	7% of orifice present
Trench 1	-	8	-	-	-	Bowl	Shell	Lohmann?	E ext., P int.	
Ftr. 13	Ass. B.C. #3	14 ± 2	0.74	0.47	1.57	Jar	Shell	Lohmann	DS ext., DS int.	<5% of orifice present
Ftr. 13	Ass. B.C. #3	18	0.62	0.46	1.35	Jar	Shell	Lohmann	E RS? ext., RS int.	<5% of orifice present
Ftr. 13	Ass. B.C. #3	12	-	-	-	Bottle?	Shell	?	DS Pol ext., E RS? lip, DS int.	9% of orifice present
Ftr. 29	Under Bundle #28	20	0.73	1.56	0.47	Jar	Shell/Grog	Lohmann	RS ext., Brwn int.	<5% of orifice present, smoothing marks present on body
Ftr. 13	Above Bundle #32	12	-	-	-	Constricted Bowl	Shell	?	3 incised lines near lip	5% of orifice present
Ftr. 12	-	18	-	-	-	Bottle	Shell	?	E/P? ext., E/P? int.	9% of orifice present
Ftr. 1	-	26	0.63	0.69	0.91	Jar	Shell	Lohmann	E ext., E int.	7% of orifice present
Ftr. 2	-	20	0.46	0.61	0.75	Jar	Grog/Shell	L.W.	CM ext., LN, E int.	5% of orifice present
Ftr. 1	-	12	0.9	0.77	1.16	Jar	Shell	Lohmann	E ext., RS lip, RS int.	

DS dark slip, RS red slip, Brwn brown slip, B burnished, Pol polished, CM cordmarked, LN lip notches, P plain, E eroded, ext. exterior, int. interior

Table 6.8 Rim Sherd Measurements Wilson Mound

Artifact Type	Length (mm)	Thickness (mm)
Cut columella	22.96	11.14
Cut columella	16.35	6.14
Cut columella	19.90	14.17
Cut columella	29.83	5.46
Cut columella	36.30	11.61
Cut columella	38.71	12.63
Cut columella	59.20	11.30
Cut columella	56.26	14.43
Cut columella	67.32	11.43
Cut columella	60.32	8.62
Cut columella	77.27	14.03
Cut columella	36.77	11.80
Cut columella	61.01	11.66
Cut columella	31.48	13.98
Cut columella	77.54	10.97
Cut columella	21.92	9.92
Cut columella	28.06	13.01
Cut columella	30.09	13.09
Cut columella	37.47	12.49
Cut columella	24.68	11.38
Cut columella	25.86	13.81
Cut columella	36.09	8.48
Cut columella	24.84	13.00
Cut columella	29.27	15.00
Cut columella	28.22	16.81
Cut columella	55.00	15.20
Cut columella	20.85	10.01
Cut columella	12.20	6.94
Cut columella	13.64	5.39
Cut columella	10.05	6.01
Cut columella	21.18	11.10
Cut columella	59.38	10.47
Cut columella	42.34	12.66
Cut columella	70.43	9.75
Cut columella	42.36	11.14
Cut columella	53.99	14.15
Cut columella	48.76	12.70
Cut columella	72.72	11.77
Cut columella	88.22	11.72
Cut columella	47.63	10.96
Averages (mm)	**40.91**	**11.41**

Broken or incomplete beads were not measured and are not included in these size averages
Total beads 39

Table 6.9 Wilson Mound Bundle #37 Cut Columellae Bead Measurements

	F 12		F 25		F 29, B 28		Surface		Lower Sand Mnd.		Burial #3		Find 36		Find 28		No Bag no.	
Groundstone	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)	no.	wt. (g)
Sandstone																		
Sandstone Abrader	1	68.2									1	8.8	1	31				
Limestone																		
Hammerstone																	1	203.1
Celt																	1	118.9
Burlington Chert																		
Flake Tool																	1	21.5
Drill																		
Scraper																		
Point																		
Debitage	1	5	1	1			2	0.9	4	17.5	2	10.6			2	18.2	1	7.6
Core	2	32.6			3	140.4												

Table 6.10 Wilson Mound Lithics

Diameter (cm)	Thickness (cm)	Diameter of center (cm)
3.52	0.13	0.16

Table 6.11 Bone Ear Spool Measurements, Wilson Mound, Burial Complex #3, Primary #1

CHAPTER 7

WILSON MOUND HUMAN REMAINS

In the last chapter I examined the relational components of the construction and use of Wilson Mound focusing on the sequence of events, which included the burial of approximately 190 individuals in a single mortuary pit. I explored the relationships between bones, shell, copper and earth to argue that Wilson Mound, and the practice of burying the dead in ridge-top mortuary mounds in general, provided a way for the living to facilitate the movement of the soul to the afterlife. In this chapter I focus specifically on the human remains from Wilson Mound and their relationship to one another; from a perspective of 'New Animism' bones and bodies have the potential to become active persons, similar to the description of the unearthed human remains presented in Chapter 3. The body, in such contexts, can become more than the sum of its parts where the treatment of the dead by the living literally transforms the dead into another kind of relational person (see Baltus and Baires 2012; Brück 2006).

Analyses of human remains often engage with demographic data, pathologies, and evidence of violence. Examining mortuary contexts from this micro-scale lens allows archaeologists to reconstruct past populations to understand the effects of disease on a population, lifespan, and to estimate population size. These data are important, but what is often left out of such analyses is the relational context of mortuary places; or how the people buried were embedded in and constituted by extended relationships with other living people, other dead individuals, and with the built and social landscapes. In my analyses of human remains from Wilson Mound not only do I present data on demographics, pathologies, trauma, and post-mortem processing I also consider the relationships between these human remains and the people who buried them, to the mound itself, and to the broader context of Cahokian ridge-top mortuary practice.

Additionally, religious practice (or the act/event of burial) is often a way people mitigate the loss of a family member or loved one and I argue that through an analysis of human remains, mortuary space, and burial practice one can obtain new insight into the processes that constitute religious belief and practice, or more simply, a Native American relational ontology (van Huyssteen 2010; see also Echo-Hawk 1993; Echo-Hawk Jr. 2009). Not only does my analysis of the following data reveal who was buried in Wilson Mound, but I also uncover the relationships enacted through/in the process of burial between the living and the dead. As Brück (2006: 311) states, "…this has implications for an understanding of both social reproduction and social transformation…where memory is neither fossilized or static but a constant productive process."

The following chapter presents my reanalysis and survey of the salvaged human remains previously excavated by Preston Holder from Wilson Mound. During a two-week trip to the Smithsonian Institution (May 2012), funded by the National Science Foundation, I conducted an osteological analysis of this set of human remains to obtain a minimum number of individuals and to identify age, sex, and pathology. It is important to note that the varying condition of bone during the original excavations of Wilson Mound prompted Preston Holder and his team to discard elements deemed not salvageable or otherwise not complete. The discarding of elements without adequately recording information on sex, age, and pathology severely limits my ability to present a thorough analysis of the individuals buried in Wilson Mound; however, the curated human remains, when supplemented with the original excavation notes and maps, provide details of two unique mortuary contexts (Burial Complex #3 [B.C. #3]; Sub-mound pit #1) and a minimum number of persons for the entire mound.

In the following analysis, data from both sets of remains from Sub-mound pit #1 and B.C. #3 are presented. Preston Holder took meticulous notes of his excavations of Sub-mound pit #1 and of B.C. #3 making comparison between his original excavation notes and records and the curated human remains a viable analytical option.

The majority of this chapter focuses on B.C. #3, as none of the human remains from Sub-mound pit #1 (L-shaped building) were recovered in the curated Smithsonian Institution collection. In specific relation to B.C. #3, I present a minimum number of individuals for each recorded bundle of human remains and the extended burials. I also include an overall minimum number of individuals for the entire mound. Further, for the curated human remains from B.C. #3, I provide a detailed account of individuals based on sex and age, pathologies, and evidence of trauma. Where possible, measurements of elements are recorded and documented (Tables 7.1-7.9). Following this analysis, I discuss the broader context of the humans remains buried in B.C. #3 exploring the possible reasons for the disarticulation of bodies as well as the significance of burial in a mass grave.

Methods of Analysis

Analytical methods employed during the analysis of the curated human remains follow those recommended by Buikstra and Ubelaker in *Standards for Data Collection from Human Skeletal Remains* (1994). Methods for estimating age included dental development and eruption (Ubelaker 1989), dental attrition (Scott 1979; Smith 1984), and general size and maturity of cranial and postcranial elements. Additional references used include *Human Osteology: A Laboratory and Field Manual* (Bass 2005) and *The Anatomy and Biology of the Human Skeleton* (Steele and Bramblett 1988). Sex was estimated using pelvic morphology following Bedford et al. (1989) as well as cranial and skeletal morphology (Buikstra and Ubelaker 1994; McKern and Stewart 1957). Elements with evidence for pathology, taphonomic changes, or trauma were photographed. Measurements of elements (using sliding calipers and osteometric board) follow protocol outlined in *Standards* (Buikstra and Ubelaker 1994) and were conducted if 1) the element was complete (length) and 2) if the measurement would aid in determining sex and age (i.e. femoral or humeral head diameter, femoral length). Femoral and humeral heads were measured (if complete) and lengths of the humerus, femur, and tibia were also measured (if complete). Teeth were assessed for wear (molars listed by cusp number as 1/2/3/4), presence of caries, linear enamel hypoplasias (LEH) and calculus (Buikstra and Ubelaker 1994). Measurements of teeth were omitted from this study and have no immediate effect on the assessment of minimum number of individuals; isolated teeth were not recovered from the Smithsonian Institution (SI) collection. All teeth inventoried were present in a dental arcade and thus attributable to a particular individual and are available for further analysis.

Assessment of minimum number of individuals (MNI) included counting repetitive elements per feature/bundle and by identifying individuals based on similarities in size, pathology, trauma, sex, and age. For the Wilson Mound remains two MNI's were assessed based on:

1) Holder's original inventory

2) Combining the number of repetitive elements and identified skeletons (SK's) (per bundle) from the Smithsonian Institution collection.

All notes from the analysis of the Smithsonian remains are curated with the North American Archaeology Lab, University of Illinois Urbana-Champaign.

Preston Holder encountered human remains in two discrete contexts during his 1954/55 excavations of Wilson Mound:

1) Eleven individuals were located in 5 bundles in sub-mound pit #1, an L-shaped pit (likely a building) with the southeastern corner located at grid coordinates $A_{125.5}$ B_{20} at an elevation of 86'

2) One hundred and ninety individuals buried in B.C. #3 located on the northeasterly flank of the core platform mound above feature 12 (a single-use wall-trench structure) at grid coordinates $A_{132'6'' \text{ to } 150}$ B_{60} at an elevation of 88'.

Sub-Mound Pit #1 (L-shaped building)

Sub-mound pit #1, superimposed by pit #3, was located along grid coordinates $A_{125.5}$ B_{20} at an approximate elevation of 86'. Holder identified this feature as sub-mound pit #1 in his notes and on his plan map; however, this feature was actually a L-shaped building (see description in Chapter 6). In this section, I maintain Holder's original feature name and number.

According to a sketch map (Book 1: 15) sub-mound pit #1 (L-shaped building) was oriented to cardinal north and measured approximately 12' x 17', with the rectangular pit # 3 oriented with its long axis northeast superimposing the northeastern edge of sub-mound pit #1 (Figure 7.1). Holder identified a "Woodland pot" and sherds he called "Old Village Red" in the fill of sub-mound pit #1 supporting an estimated date from the Terminal Late Woodland (TLW) to early Mississippian period. Additionally, Holder notes a "clean yellow sand floor" at the bottom of sub-mound pit #1 (Book 1: 14). It is clear from his notes that this set of features housed the bundled remains of at least 11 individuals (based on the presence of 11 crania) buried in clusters similar to the later B.C. #3. In his notes, Holder also described a 'conch blanketed primary burial' located in sub-mound pit #1, but it was removed with a bulldozer prior to his excavations. The possible presence of such a burial indicates a similarity among the primary conch blanketed burial at Mound 72 and the similar burials in Powell Mound (see Chapter 4) (Table 7.1). Although details on this particular burial are limited, the following description presents the most accurate account of these remains and burial context (Book 1: 7-15):

> There must be a high percentage of children's remains in this burial since the tops of milk teeth show up in the general debris. Also note the skulls are 'paper thin'. All bones

share a reddish cast (not from ochre, however) and are soft and badly disintegrated. There is no doubt that this is a bundle burial, probably in association with Burial # 1 in Pit III. Can't tell number of individuals yet. Nebgen found at least 3 new skulls along easterly edge; Holder found one in southerly edge. Nebgen found bundle of 3 skeletons with NW oriented long bones about midway along easterly edge. Look like child's bones. Probably femur and tibia and humerus, obviously not articulated. A few random flint chips and pieces of ochre in fill. Berta, Bowers, Holder at dig…Bowers working west edge along B_{120} on edge of Pit III; found some new long bones, and skull #7. This looks like well preserved adult skull, have exposed what looks like left parietal and occipital…Skull is apparently face down with top easterly and base westerly, looks like have mandible with just gonial [angle] exposed. Random milk and permanent teeth continued to show in rodent debris. A few sherds also, at least looks like Old Village Red. Berta set to cleaning out SW corner of pit. Resting on pit base-clean yellow sand-found burial #5, which is probably merely an extension of burial #4. Bones are in bad shape. As it stands we have indications of some 5 skulls and some long bones. These skulls are all very fragmentary and poorly preserved. N.B. [found Woodland pot] with bones etc. in it, rim sherd stood vertically and bones were inside it.

Based on the above description and the sketch map, this feature consisted of at least 5 bundles and 11 crania, which include the remains of multiple children buried in an L-shaped feature, along with a set of disarticulated remains buried in a Woodland pottery vessel.

Burial Complex #3 (B.C. #3)

B.C. #3 is a rectangular burial feature (long axis oriented roughly NW) located on the northeasterly flank of the core Wilson platform mound above feature 12 (wall-trench structure) at grid points $A_{130-150}$ B_{60-80} at an elevation between 87'5"-88'. During excavation De Marais Nebgen, Preston Holder, and Joyce Wike identified 43 bundled sets of human remains and 5 extended individuals arranged in a space 4 m x 6 m; these individuals were buried directly on top of thin layer of gumbo clay used to cap the burned feature 12 (Archaeological Data Sheet: 66, 70). B.C. #3 contained pottery, copper-covered ear spools, a chunkey stone, a bear tooth pendent, at least 24 whole conch shells and over 6,000 marine shell finished and unfinished disk and columellae beads. An AMS radiocarbon date of an unfinished marine shell disk bead from this burial complex provided a calibrated date of AD 1052-1195 (p= 1.00) (calibrated at 2s using the program CALIB 6.0 [Stuiver and Reimer 1993]). George Milner, in his 1982 dissertation (pg.

269), presents a minimum number of individuals (MNI=184) for B.C. #3 and cites the presence of cut marks "apparent on many of the bones present in the Smithsonian collection" but did not present specific details of age, sex, or pathology. Susan Alt and Timothy Pauketat (2007) also note the unique mortuary context of B.C. #3, focusing on the manner of death of two primary young females both buried with, presumably, their infants.

Holder (Book 1: 30) described B.C. #3 as a "mess with primaries, secondaries, dogs, etc." Discrete bundles of remains were identified as clusters of multiple crania, long bones, and articulated and unarticulated elements. Nebgen notes the presence of secondary ligatured, secondary unarticulated, and primary burials (Archaeological Data Sheet: 67). Secondary ligatured burials consist of bound individuals (like bundle #4); primary burials were identified as inhumations of articulated skeletons buried in a prone, supine, flexed, or extended position. Secondary unarticulated burials account for the discrete bundle burials identified as disarticulated piles of human remains consisting of multiple individuals interred in a co-mingled context (varying ages and both sexes). Bundle (pile) burials may also contain a single person disarticulated and bundled together. In the context of B.C. #3 both primary and secondary interments were buried at the same time during one depositional event (see Chapter 6).

Bundle burials present a complicated context for excavation and analysis as the remains from one individual are often distributed across multiple bundles, and are disarticulated and buried in co-mingled layers of human bone elements. Providing an accurate representation of all the individuals buried in a particular bundled context is difficult at best. In the context of B.C. #3, Preston Holder and his team did an impeccable job at recording the orientation, placement, and organization of the remains excavated (Figure 7.2); however, not all of the elements from each bundle were recorded nor were they salvaged for future analysis and curation. Holder selected elements in 'good' condition for further analysis thus biasing the sample present at the

Smithsonian Institution (see Table 7.3). The remains not salvaged for curation were likely discarded at the time of excavation.

Minimum Number of Individuals (MNI)

It must be noted that the remains present at the Smithsonian Institution were previously inventoried and analyzed by George Milner as part of his dissertation work; based on a comparative analysis between the curated remains and Holder's original assessment Milner obtained a MNI of 184 individuals for B.C. #3 (1982: 270). In the following, I present two separate MNI's based 1) on data recovered from Holder's notes and map, and 2) on the remains curated with the SI.

Holder provided a list of elements for most of the bundles he excavated (Table 7.2); additionally, the map of B.C. #3 is very thorough making identification of human bone elements possible. For those bundles recorded in the notes and on the map, Holder and his team identified elements by sex, age, and size. By considering all of Holder's recorded data (notes and map) I obtained a MNI of **190**; this MNI provides what I would argue the more accurate number of persons present in B.C. #3 as it takes into account all the originally available data (see Table 7.2, Figure 7.2).

In addition to the MNI based on Holder's notes and map, two additional MNI's were recorded based just on the SI curated collection of remains; these estimates are substantially lower than the MNI assessed from Holder's original notes and consist of 1) identifiable discrete individuals (SK) and 2) redundant elements by bundle. **Twenty-six** SK's were identified by bundle if more than one element was attributable to a single individual (Table 7.7). The identifications of SK's followed similar protocol used to assess the MNI for a co-mingled burial at the Grossmann Site (11S1131) (see Baires, Hargrave and Hedman report on file ISAS); in the Grossmann context elements from the same individual were recorded by identifying similarities in taphonomic changes, trauma, size (robust/gracile), sex, and age. The identification of SK's in the B.C. #3 context only occurred if specific evidence (shared pathologies and size) was documented to indicate that particular elements represented the same person, or if the previous inventory conducted by the SI (and Milner) identified sets of elements as discrete individuals.

In addition to the identification of individuals based on the above characteristics, a MNI was also based on the redundancy of elements (crania, mandible, sternum, scapula, clavicle, humerus, radius, ulna, innominate, femur, tibia, fibula) for every curated B.C. #3 bundle. This resulted in a total of 58 adults and 2 children (n=60) (See Table 7.4, 7.6). The majority of elements were identifiable by type (i.e. femur, humerus, etc.) and side, but some were unattributable to a side, or were too fragmentary to identify the element. The later were not included in the analysis. MNI by redundant element is broken down by adults, children and infants, and by sex where attributable (see Tables 7.3, 7.4, and 7.6). Age and sex categories follow Buikstra and Ubelaker (1994: 9).

The Primaries

Holder and crew excavations identified five primary interments (articulated, supine, flexed, semi-flexed, or extended) buried amongst the 43 bundles of human remains in B.C. #3. These primaries consist of 3 women, each buried with an infant, and 2 additional children. Speculation surrounding the manner of death of primaries 1 and 2 (both young women) include hypotheses of death by decapitation, death by childbirth, and death by blunt force trauma (see Alt and Pauketat 2007; see Milner 1982, 1984; see Holder personal notes on file UMMA). Both women were buried with infants, whom Holder identified as newborn for primary #2 (buried on the abdominal region) and *in utero* for primary #1. Both women were buried in flexed positions (supine torso with knees drawn up and feet planted on the ground) with tightly clenched hands and feet. These women were also buried next to one another with the tops of their crania toward the southwest (1) and northeast (2). Primaries #3 and #4 were both children buried in flexed positions; primary #3 was laid on top of a series of disarticulated remains in bundle #1 and placed along the right side of primary #2. Primary #4 was laid on top of the disarticulated remains of bundle #3 with his/her head oriented to the south. Primary #5, an adult female, was buried in an extended supine position with the top of her cranium oriented to the northeast; an infant cranium was located near her right knee and infant rib fragments were located underneath her pelvis. No other primary interments were located in B.C. #3. The following short summaries present specific data on each primary burial gathered from Holder's notes and the remains curated with the SI.

Primary #1

Primary #1 is an adult female buried in a supine position with flexed legs. Both arms were positioned next to her torso, legs bent at the knees with her fingers and toes in a "cramped, clenched position" (Archaeological Data Sheet: 68). Holder noted the "legs of primary #1 must have been pulled up in a flexed position and when the weight of the earth pushed down on the legs, the proximal end of femur would have been forced to lie just below the ankles" (Archaeological Data Sheet: 68). Holder estimated sex based on the presence of an unborn fetus *(in utero)* oriented with his/her head toward the pubic symphysis likely in position for birth. Additionally, the skull of primary #1 was badly crushed, likely due to post-mortem taphonomic changes (Figure 7.3). Holder also notes some copper staining on the lingual surface of the mandible and identified a "1" diameter bone ear spool inside the [mandibular] lingual cavity" (Book #1: 53). Hematite was also scattered on the gumbo clay surface below primary #1 and a small dog was buried near her legs with its body oriented west to east.

Primary #1 was relatively complete and the majority of her skeleton was curated with the SI (Table 7.5). Non-metric cranial traits for sexing support Holder's sex estimated of female (mastoid: 2, mental eminence: 3, brow ridge: 2)(Buikstra and Ubelaker 1994: 20). Measurements for the right and left femoral head (4.1 cm, 4.2 cm respectively) also support the identification of female (see Bass 2005). The right femur measured 46.3 cm in length and the left and right humeri measured 31.2 cm and 32.0 cm in length respectively. Unfortunately the pelvis was not located in the collection. No evidence for trauma was identified on any of the long bones or present cranial fragments. No evidence for dismemberment (cut marks on long bones) was identified. Some osteoarthritic lipping was present on the thoracic vertebral facets as well as compression of the thoracic vertebral bodies. The teeth include the left and right mandibular molars, premolars, canines and second incisors (missing the first incisors). Minimal wear (small pinprick area of dentin exposure) was visible on all teeth (scores ranging between 3-4, placing her in the age range of 20-30) (Lovejoy et al. 1985).[6]

Primary #2

Primary #2 was an adult female buried northwest of primary #1; her torso (oriented northeast) was placed in a supine position with her legs bent at the knees like primary #1. Primary #2 burial included an infant placed on her abdominal/pelvic region, and like primary #1 her fingers and toes were in a tightly clenched and curled position. Holder estimated sex during original excavation as female, mainly based on the presence of the infant. Holder did not record any additional measurements or note any additional characteristics for sexing or aging; the remains were also not sent to the SI for curation. Holder describes primary #2 (Book 1: 60):

> [A] hole in left scapula looks pre-interment, also did not find any ribs in upper left thoracic region (is this some sort of mutilation at death?) Also note no skull at upper end vert. column, also no cervical vertebrae! Is this decapitation? Only skull found is

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[6] Due to time constraints an extensive analysis of the teeth was not undertaken. General observations were observed and recorded.

> the one in abdominal region. If this is her skull, and see no reason shouldn't be, there is some fancy mutilation going on. Also see anomalous position of patellae. Could only be at ends of femora if held there by ligaments and no chance tibiae 'migrating' to present position-must have been thrown in that way. Same reasoning applies to Prim #1 and note both had those clenched hands!

This description of the placement of the body and the condition of her remains suggests that primary #2 did suffer some sort of trauma prior to or immediately after death. In the absence of the actual remains I can only hypothesize that this individual was decapitated and buried with her head placed under her left arm (see Figure 7.2). It is unclear if this decapitation occurred prior to or after her death.

Although Holder speculates in his burial description that her legs were intentionally separated at the knee, and that this treatment was shared with primary #1, I would instead suggest (following his original assumption) that the legs were bent at the knee at the time of burial resulting in the orientation of the tibiae on top of the femora. Because this individual was fully articulated with flesh at the time of burial, cut marks should be visible on the distal ends of the femora and the proximal ends of the tibiae if these elements were intentionally separated from one another (see discussion section of this chapter). As stated previously, no cut marks were present on the bones of primary #1 to indicate any intentional separating of the femora and the tibiae.

Primary #3

Holder identified primary #3 as a child buried in a flexed position on his/her left side interred on top of the disarticulated remains of bundle #1. The remains of this child were not located at the SI; skeletal inventory is based on Holder's notes and map (Book 1: 57):

> Child skull mentioned above badly smashed, probably belonged to an articulated child's skeleton lying on left side beside primary #2. Only thorax, cervical vertebrae and humerus surface exposed, looks like may be flexed.

Primary #4

Holder identified primary #4 as a child buried in a flexed position within bundle #3. An age of 8-10 years is notated on Holder's map, however he does not provide any metrics or non-metrics to support this age designation. The remains of this individual were not curated with the SI.

Primary #5

Primary #5 was an adult female buried in a supine position with her head oriented toward the northeast and turned to the left. Both left and right arms were placed at her sides; an infant skull and rib fragments were identified underneath her right knee and pelvis area. Holder identified primary #5 as female; he recorded no metric or non-metric traits to support his identification. A measurement of the entire body (from cranium to feet) was recorded as 4'11". Holder notes that this individual was likely buried on a slope, as the head was approximately 4" lower than the axial skeleton. No evidence for pathology or age was recorded. These remains were not curated with the SI.

The Bundles

The following accounts of the 43 identified bundle burials draw from Preston Holder's written notes (Book 1, 2; Archaeological Data Sheets curated at the University of Michigan Museum of Anthropology [UMMA]), map (see Figure 7.2), and the SI curated human remains, which include bundles 1-8, 12, 16-18, 21-27, 19-35, 37, 39, 40, 42, and 43. In each of the following summaries I present a skeletal inventory recording demographic data, pathology, and trauma (see Tables 7.8, 7.9). Grid coordinates for each bundle are included if reported in Holder's notes; otherwise please see Figure 7.2 for the organization of bundle burials in B.C. #3. Bundle orientations refer to the estimated direction of the long axis of each bundle as drawn on the original map. If element measurements were recorded (depending on the condition of the remains and what sections of the elements were present [i.e. articular surfaces, long bone shafts]) they are reported below (see previous section on MNI) (see Table 7.9). If elements could be identified and attributed to discrete skeletons (SK's), descriptions of each SK are included below (see Table 7.7). If elements could not be identified to a discrete SK, an MNI based on repetitive elements is provided per bundle (see Tables 7.4, 7.6).

Bundle #1

Bundle #1 was located between coordinates $A_{133\text{-}135'6''}$ and $B_{73\text{-}74}$, and oriented southwest to northeast. One adult female (SK 1) and two adults of unknown sex were included in this bundle. Elements unattributable to a SK include 1 left adult fibula, 2 left adult ulnae, 1 left and 1 right adult humeri, 1 left adult femur, and 1 right adult femur. The left adult femur (shaft and distal epicondyles) has approximately 5 shallow, short cut marks (<1 cm in length) present on the proximal anterior surface below the greater trochanter. Additionally, 1 adult right femur shaft with osteomyelitis on the anterior surface was present in the SI collection.

<u>SK 1</u>

SK 1 is an adult female between the ages of 20-29 represented by a left innominate (auricular surface, pubic symphysis, sciatic notch and iliac crest), and both left and right tibiae shafts. The designation of these elements as representative of the same individual was made during the original Smithsonian assessment of the remains. The auricular surface of the left innominate shows signs of billowing and fine granularity, no apical activity and no retroauricular activity were visible (Buikstra and Ubelaker 1994: 25). The narrow sciatic notch indicates female (score of 1).

Bundle #2

Bundle #2 was located northwest of bundle #1 and contained the co-mingled remains of at least 6 adults (based on repetitive right femora). Holder's original bundle inventory included 4 crania, 1 infant skeleton, 1 innominate, and 11 long bones representing 3 adult females, 1 adult male, and 1 infant. The remains curated at the SI consisted of 30 elements including at least 1 adult male, 1 adult female, and 5 adults of unknown sex (represented by 5 right femora). Cut marks were present on 3 elements: 1 right ulna (posterior surface of olecranon), and 2 (right and left) femora (posterior surface on the greater and lesser trochanters) (Table 7.8).

<u>SK 2</u>

SK 2 consists of a single mandible with the right M_1, M_3, $PM_{1,\ 2}$, C_1, I_2 and the left $M_{1,\ 2}$ present. The alveolar bone shows no evidence of remodeling and suggests all teeth were present at the time of death. The mental eminence for this individual was very pronounced (score of 5), indicating male. The right incisors, canine, and premolars were fairly worn (score of 4, 4, 5, 5 respectively) and the molars showed evidence for moderate wear and small dentin exposure (Buikstra and Ubelaker 1994). Minimal calculus deposits were present on the right PM_1, C_1, and I_2 (buccal surfaces, score of 1, 2, 2 respectively) and on the left $M_{1,\ 2}$ (lingual surfaces, score of 2, 2 respectively).

<u>SK 3</u>

Both right and left femora (proximal epiphyses and shaft only) represent SK 3. The left femoral head measured 4.2 cm and the right femoral head measured 4.1 cm confidently identifying this as a female individual (Bass 2005). Additionally, cut marks were present on the posterior proximal surface of the right femur across the greater and lesser trochanters. These cut marks (n=7, <1 cm in length) were short, v-shaped, shallow and placed successively next to one another.

Bundle #3

Bundle #3 was located along grid coordinates A_{139} B_{79} and contained at least 4 crania, and multiple sets of long bones oriented north/south. Bundle #3 also contained the remains of primary #4 (described above). Based on Holder's original map 1 innominate and 1 articulated vertebral column (with ribs) were also included in this bundle.

The remains curated at the SI contained at least 2 individuals (1 adult M and 1 young adult of unknown sex) and one unattributable right proximal foot phalange.

SK 4

SK 4 is an adult male represented by the right and left humeri, right and left ulnae, right and left radii, right femur and left tibia. The deltoid and brachial tuberosisties on both the right and left humeri and the pectineal line on the right femur are fairly robust. The right femoral head measures 4.9 cm and the femur measures 45.6 cm in length supporting a sex designation of male (Bass 2005). The right humeral head measures 4.4 cm in diameter and is 32.5 cm in length. The left tibia is 39 cm in length.

SK 5

A left humerus and a right clavicle represent SK 5. Both elements were still in development, likely around age 14-17 based on the union of the humeral head to the shaft (see Bass 2005: Figure 3.37) and the beginning stages of union of the epiphyseal cap on the medial end of the clavicle (McKern and Stewart 1957: 91-92). Sex was not determined. No other elements were present with this SK and no evidence of pathology or trauma was identified on either of the elements.

Bundle #4

Bundle #4 was located southwest of bundle #3 and contained the remains of one young adult female. Holder (Book 1: 32) described the bundle as:

> Not a typical bundle, must have been ligatured-femurs in articulation with pelvis etc. Actually a part of primary #1; dog burial covers part of it.

When looking at this burial on the map it appears that the humeri, radii, ulnae, and hand elements (both left and right) were articulated upon burial (See Figure 6.2). The pelvis, the right and left femora and at least the left tibia were also in articulation with one another; it is possible that the legs were bent up in the same fashion as primaries #1 and 2 resulting in the final orientation of the left tibia on top of the left femur. The young females' hands seem to be cradling her skull, which was removed from her body and placed in her abdominal area. No vertebra, ribs, scapulae, or clavicles were depicted on the map suggesting that the remains were partially disarticulated prior to burial. No remains were relocated in the SI collection.

Bundle #5

According to Holder's map and notes Bundle #5 consists of 3 innominate bones, 1 clavicle, 2 radii, 1 scapula, 2 femora, 1 tibia, phalanges, carpals, and at least 1 cranium and mandible. The bundle was located at grid points $A_{135}B_{73}$ at an elevation of 87 '10 "; long bones were oriented approximately southwest to northeast. One right femur was curated with the SI and measured 52.2 cm in length (missing femoral head) attributing this element to an adult male (Bass 2005). No pathology or trauma was identifiable on this element.

Bundle #6/7

On Holder's original map, bundles, #5, 6 and 7 are depicted as sections of one larger bundle; the collected remains and notes were recorded separately and designated as bundle #6. Thirty-four total elements from bundle #6 were curated with the SI. Of these 34 elements, 8 elements (4 femora, 2 ulnae, 2 radii) displayed cut marks located on the proximal and distal articular ends near articular facets and on/along muscle attachments. No other evidence for post-mortem processing was present.

A MNI based on right femora indicates the presence of at least 1 adult M and 1 adult of unknown sex. One right innominate (sciatic notch score: 1) represents one adult female; the auricular surface of this element was fairly eroded, however the area was more granular and porous than billowing or transverse suggesting an older adult (Buikstra and Ubelaker 1994). Five right radii were also present indicating the presence of at least 5 additional persons. In total at least 1 adult male, 5 adults of unknown sex, and 1 adult female were present in bundle #6.

<u>SK 6</u>

One adult male was identified by multiple elements: one left humerus (shaft and distal epicondyles), the left and right radii and ulnae, and one right femur (femoral head diameter 4.7 cm). Cut marks were present on the proximal posterior surface of the right femur near the greater and lesser trochanters. These cut marks were shallow in depth and short in length (<1.5 cm).

Bundle #8

A description of bundle #8 was not relocated in Holder's original notes; but the details of the bundle are included on the map of B.C. #3. Bundle #8 is located above bundle #5/6/7. All bone elements are oriented southwest to northwest and consist of (according to the map) at least 3 innominate bones, 4 ribs, 1 crania (and possibly 2 additional crushed crania), 2 femora, 2 ulnae, and 2 fibulae. Remains from this collection were relocated at the Smithsonian and were assessed as representing at least one adult female (SK 7).

<u>SK 7</u>

SK 7 consists of portions of the alveolar process of the right and left maxilla, the eroded head, shaft and distal epicondyles of the right femur and the shafts of both the left and right tibiae and right fibula. The right femur measures 41 cm in length (suggestive of female) (Bass 2005). The diameter of the femoral head was not measured (element was broken and eroded). Nine maxillary teeth are present in the dental arcade: RPM^1, ^{2}, RC^1, RI^1, ^{2}, LI^1, ^{2}, LC^1, LPM^1. All four incisors are shoveled (score of 3). Calculus (score of 2, 2, 2, 2, 2, 1, 1, 2, 2 respectively) is present on the buccal surface of all teeth. Dental wear was mild (score of 3 for the incisors and canines, score of 4 for premolars) suggesting an age of 16-20 (Lovejoy et al. 1985). No pathology or evidence for trauma was identified on any of the present remains.

Bundle #9

Human remains from bundle #9 were not relocated in the SI collection. Holder documented the removal of bundle #9 fairly well, identifying at least 2 adult males, 2 adult females, and 1 infant. Bundle #9 is located northwest of bundle #8 with approximately 5 crushed crania located on the southwestern border of the bundle with the long bones oriented toward the northeast. Two copper-covered bone earspools were identified on the northwestern boundary of the bundle- one on each end (not associated with a particular cranium). A collection of bird bones was co-mingled with the remains of one of the adult males. Holder describes the two adult males as "large"; and indicates minimal tooth wear (third molars were present) for the adult female. Additionally Holder recorded a "small 1 yr infant was mingled in with the long bones" (Book 2: 23). Holder recorded multiple other elements in this bundle indicating the presence of 19 total individuals.

Bundle #10

Bundle #10 was located northwest of bundle #9 with long bones oriented southwest to northeast. At least 3 crania were present in this bundle on the northeastern edge. Holder records that the boundaries between bundle #9, 10, 11 may be arbitrary noting that the bones are in very bad condition; no phalanges, no vertebrae nor any ribs were salvageable from this bundle (Book 2: 20). No remains were curated in the SI collection.

In total Holder identified three discrete individuals: 1 older adult female, 1 adult female, and 1 adult male. One humeral fragment from a child was also identified. Portions of a maxillary dental arcade identified the older adult female; the central mandibular incisors were the only teeth left in the dental arcade at the time of death and suggest that the remaining teeth were lost prior to death (Book 2: 26). Additionally Holder notes that the coronal suture was fully closed/obliterated.

Bundle #11

Bundle #11 was located northwest of bundle #10 and, as recorded by Holder, consisted of at least 1 adult male, 1 young male, 2 adult females, 1 child and at least 8 additional persons represented by mandibles (Book 2: 19) (no remains were relocated at the SI). Holder notes that a partially articulated torso (ribs, vertebra) represented a child; one robust adult male was present and the remaining individuals consisted of children and women. No other data was recorded on the remains from bundle #11.

Bundle #12

Bundle #12 was the last bundle located on the western edge of B.C. #3 and marked the northwestern corner. Holder identified at least 3 individuals: 1 young adult male, and 2 adult females. The long bone elements and crania were oriented southwest to northeast. The remains of at least 1 adult male individual (SK 8) were relocated in the SI collection.

<u>SK 8</u>

SK 8 consists of the occipital bone, first cervical vertebra, the right mandible, right humeral head (very eroded), the proximal end of the right radius and right ulna, the epicondyles of the left humerus, the distal end of the left ulna, the left femoral head (5.1 cm), the diaphysis of the right femur, the distal end of the right fibula, and the medial malleolus of the right tibia. The nuchal crest of the occipital was fairly robust (score of 4) indicating male. The right mandibular $M_{1,2}$ were present in the dental arcade. Both molars had small areas of dentin exposure indicating mild/moderate wear (scores of 3/4/4/4 for both molars). The original Smithsonian inventory card estimates age between 25-35 y.o. (based on minimal tooth wear).

No measurements were recorded for any of the aforementioned elements (with the exception of the left femoral head), as all were very fragmentary and eroded.

Five cut marks (1 cm in length) were present on the right proximal medial surface of the ulna; these were shallow, short and placed fairly close together. Four cut marks (~ 1 cm in length) are present on the medial surface of the left femoral neck directly below the femoral head, suggesting that the individual was intentionally disarticulated prior to burial in bundle #12.

Bundle #13

Bundle #13, a small grouping of 2 skulls and 7 long bone elements, was located northeast of bundle #12 on the western boundary of B.C. #3. Holder notes that the remains were in very poor condition upon excavation; none of the remains were salvaged. He recorded at least 1 adult male, 1 adult female, and 1 child (indicated by “a few teeth”).

Bundle #14

Bundle #14 was located northwest of bundle #13 and superimposed part of sub-burial pit #2. Bundle #14 contained 1 cranium, 1 mandible (with $M_{1, 2, 3}$ present in the dental arcade), 2 innominate bones, 1 tibia, 2 fibulae, 1 humerus, 1 femur, and 2 ulnae fragments. Holder identified at least one adult female. None of the remains were curated with the SI.

Bundle #15

Bundle #15 was located southeast of the left leg bones of primary #5, abutting bundle #11. The details of bundle #15 are very intricate and unique and contained at least 3 individuals, over 1,000 shell beads, and approximately 5 conch shells (as recorded by Holder). None of the remains were relocated at the Smithsonian. The following description is transcribed from Holders notes (Book 2: 30-33):

> This bundle is composed of most of bones of 2 individuals: a very robust male, and a gracile young adult, probably female (maybe a male youth?). The smashed skull at the

west end did not seem heavy enough to fit the massive male long bones, no supraorbits nor face bones. Parts [of] only this one skull was found. Near the skull recovered parts of 2 mandibles, one with many lost molars and extensive wear on those [teeth] remaining. This mandible would seem to belong to the crushed skull but was not in articulation; the other mandible fragment had massive molars showing no wear! No skull to match. Skull and mandibles at west end (this first burial oriented E-W, flanked on either side by large 10" conch shells mouth up spine west post east). Under these on north side heads of long bones of massive male which ran E-W piled in neat pile with random ribs, verts, phalanges along and over shafts, over distal ends another large conch mouth down, spine east, point west, lying over crest of massive male innominate, pubes west. The mate to this innominate oriented the same was mirror imaged under a similar conch about 6" south and enclosed ends of a bundle of gracile long bones whose westerly ends lay under another conch spire west point east mouth up (this is southern of 2 flanking conches described above). This whole complex covered with 1,000 or more conch disc beads varying from 1 ½" diameter to 1/4" diameter. Along the west end of bundle (none on skull) seemed to be strewn as though strands of strung beads had been laid there. There was a relatively empty area across center of shafts. But whole east end was blanketed with masses of beads, then some small snail shells. These had penetrated down along the long bones…this blanket extended unbroken across the other innominate and conch but stopped abruptly to east, also spilling around edges. Nebgen and Wike felt these were strung strands; Holder in field felt at best a random distribution, maybe a "blanket" or "apron". At home washed most of the "loot". Certainly motley assortment: big, little, crude, fine, square, round, a few bone disks, some well-drilled holes, some poorly drilled, some disks are rough, some with lip of conch still present, others polished down carefully. My feeling is if these were finished beads pretty sloppy taste. More likely this is a bead-makers "store" with raw conchs, blanketed in drilled beads and some finished beads. Summary: bundle composed of massive adult male and gracile female (?). One skull (sex? Age 60?), 2 mandibles, normal, complement bones bundled massive [male] to north gracile [female?] to south long axis E-W. A 10" gulf coast conch at each corner pointing inward, west ones mouth up; east ones mouth up. While blanketed with conch disc beads showing tremendous various in degree of "finish".

Bundle #16

Bundle #16 was located southeast of bundle #15 and Holder notes that the boundary drawn between the two bundles is likely not accurate (suggesting instead that bundles #15 and #16 constitute one larger bundle). Holder identified at least 9 individuals 4 of which he recognized as 1 adult male, 2 adult females, and 1 child. One mandible was present in the SI collection, likely attributable to one of the females. The right and left mandibular molars ($M_{1,2,3}$) were present with mild cusp wear. The mental eminence for this mandible was slight (score of 2) indicating female (Buikstra and Ubelaker 1994). Holder (Book 1: 36) provides a detailed description of this bundle as follows:

> Bundle burial composed of at least 9 individuals, 1 male, 2 female, 1 child. 3 large conch shells associated with this bundle, which was covered with conch shell beads. Long bones were oriented E-W fashioned as in bundle #15. Male innominate placed relatively at easterly end of bundle, two female placed horizontally…Child remains under long bones at NW corner, very small probably 1 to 2 years. Ribs, phalanges, tarsals and carpals scattered throughout. One tooth looked as though it might have been filed. Conchs oriented with points toward center of burial, mouths up.

Bundle #17

Bundle #17 was located on the western edge of B.C.#3 and contained at least 3 individuals: 1 adult male, 1 adult female, and 1 child. Two discrete individuals were identified in the SI collection: 1 young adult female and 1 adult male. Bundle #17 also contained two left tibiae: one (diaphysis only) with evidence of active periostitis on the anterior lateral shaft and one (complete) measuring 36.4 cm in length. Neither element could confidently be attributed to either of the aforementioned SKs.

<u>SK 9</u>

The left and right femora represent SK 9, a young adult female. The diameter of the right femoral head measured 4.1 cm with a femoral length of 42.5 cm. The left femur is broken and consists of only the shaft. The right femoral head is united with the neck, but the epiphyseal line is clearly demarcated. No pathology or trauma was noted on either the right or left femora.

<u>SK 10</u>

The left (diaphysis only) and right (proximal end and diaphysis) femora identify this individual as an adult male(?). The diameter of the right femoral head measured 4.5 cm; the gluteal line, pectineal line, and linea aspera are very pronounced/robust on both the right and left diaphyses. No pathology or trauma was identified on either element.

Bundle #18

Holder identified bundle #18 as containing only 1 adult male with long bones oriented N-S and laid directly on the gumbo surface used to cap feature 12. Bundle #18 superimposed pit #3 and was located in the middle of B.C. #3. Human remains representing one adult female (SK 11) are curated with the SI.

<u>SK 11</u>

SK 11 consists of the right clavicle, right and left humerus, right radius, left tibia, and sternum of an adult female. The xiphoid process was fully fused to the sternum suggesting at least an age of 30 (Bass 2005). The right and left humeral head diameter measures 4.1 cm, with an overall length of 31.4 cm. The length of the left tibia measures 37.5 cm. Holder identified this individual as male, however the humeral head diameter suggests that this person is more likely female. Without the pelvis or femur, sex estimation cannot be made with certainty. No pathology or trauma was identifiable on any of the elements.

Bundle #19

Bundle #19 was located adjacent to bundle #18 partially superimposing pit #3 and consisted of at least 1 adult female, 1 adult of undetermined sex, and 2 adult males. None of the remains were relocated at the SI. Three conch shells (apex oriented northwest) were included in the southeastern corner of bundle #19. Holder notes that the female skull was very small in size; the central maxillary incisors were lost prior to death. No other details were recorded for any of the remaining individuals.

Bundle #20

Details of bundle #20 were not relocated in Holders notes and human remains were not relocated with the SI. Bundle #20 was mapped southeast of bundle #16 with long bones oriented southwest to northeast. Two crania, 2 innominate bones, 2 femora, 2 ulnae, 2 tibia, and 4 unidentified elements were present in this bundle along with a covering of marine shell disk beads (similar to bundles 15, 16). On the original map of B.C. #3 Holder identified one cranium as male. No other details were recorded for any of the remaining elements.

Bundle #21

Bundle #21 was located on the northeastern corner of B.C. #3 next to bundle #17 at approximate grid points A_{146} B_{65}. This bundle consisted of multiple disarticulated and bundled elements oriented roughly north to south and laid directly on the gumbo clay surface (Archaeological Data Sheet: 87). Holder identified at least 1 adult male, 1 adult female, 1 child, and 1 young adult of unknown sex (based on identifiable crania). Remains from one adult male (SK 12) were relocated in the SI collection.

<u>SK 12</u>

SK 12 consists of the shafts and distal epicondyles of the right and left humeri, the shafts of the right and left radii and ulnae, the shaft and distal epicondyles of the right and left tibiae, and the complete left femur. Active periostitis was present on the anterior shaft surface of the left tibia. The diameter of the left femoral head measured 4.5 cm and the length of the left femur measured 42.6 cm. The diameter of the femoral head suggests male although this measurement could be attributable to a more robust female (Bass 2005). Both the left and right deltoid tuberosities (humeri) were very pronounced as well as the brachial tuberosities on the left and right ulnae. No other evidence for pathology or trauma was identified on any of the elements curated at the Smithsonian.

Bundle #22

Bundle #22 was located on the northeastern boundary of B.C. #3 next to bundle #21 and consisted of both long bones and crania roughly oriented north to south; these elements were laid directly on the gumbo surface and were similar in burial orientation to bundle #21. Holder recorded three adult females, identified by three crania, and 3 adult males identified by one cranium and 2 additional sets of femora.

Three long bones were located at the SI; these elements could not be confidently attributed to one individual and were likely from three different persons. A left femur represents one female: femoral head diameter measuring 4.1 cm and a femoral length measuring 45.8 cm. A right and a left tibia were also present in the collection measuring 36.1 cm and 36.8 cm in length respectively. The left tibia was slightly more robust than the right making it difficult to confidently identify these elements as the same individual. The MNI for this bundle (based on remains from the Smithsonian) is at least 1 adult female.

Bundle #23

Bundle #23 was located to the southwest of bundle #22 at grid coordinates $A_{143}B_{67}$ and consisted of groupings of both long bones and crania. Five crania were placed on the northwestern edge of the bundle, in a line, with sets of long bones oriented northwest to southeast placed directly beneath each skull. Holder and his team identified 2 adult females, 2 adult males and 1 infant. The remains, like bundles #21 and #22 were placed directly on the gumbo clay surface; based on the map it appears that each skull was associated with a set of long bone elements; it is unclear if the long bones were part of discrete individuals or were from multiple different persons.

One mandible from an adult male was present at the SI. The $RM_{1,\ 2,\ 3,}$ $RPM_{1,\ 2,}$ LC_1, and $LM_{1,\ 2,\ 3}$ were all present in the dental arcade and the sockets for the remaining teeth were open (indicating the teeth were lost post mortem). The right and left M_3 were not in total occlusion (placing this individuals age between 15-21 [Buikstra and Ubelaker 1994]). The present teeth also showed signs of minimal wear with occlusal wear facets invisible or very small with no dentin exposure (Buikstra and Ubelaker 1994).

Bundle #24

Bundle #24 was located east of bundles #21 and #22 northwest of bundle #23. Based on Holders original notes and map 3 adult females, 2 adult males and 1 child were identified in this bundle. The remains were oriented with the skulls placed on the northeastern edge of the bundle and the long bones positioned directly below each skull and oriented northeast to southwest. Remains of 1 adult male (SK 13), 1 y. adult (sex ?) (SK 14), and 1 infant (SK 15) were present at the SI.

<u>SK 13</u>

SK 13 was identified as an adult male consisting of both right and left femora, right and left tibiae, and right and left fibulae. The right femoral head measured 4.8 cm in diameter. Fifteen shallow cut marks (between 0.5-1.0 cm in length) were present on the posterior surface of the femoral neck under the femoral head and above the lesser trochanter. The left femur is missing the femoral head; estimated length for the left femur is 43 cm. The left tibia measures 36.6 cm in length. Length measurements for the right tibia and right and left fibulae were not taken (these elements were incomplete). Elements were identified as part of the same individual based on their overall size and robustness. No pathology or additional evidence for trauma was identified on any of the elements.

<u>SK 14</u>

SK 14 is a young adult of unknown sex consisting of the shafts of both the left and right femora and the proximal epiphyses and shafts of the right and left tibiae. An estimated length for the left femur is 43.6 cm. The proximal epiphyses of the right and left tibia are not completely fused suggesting an age range between 14 and 20 (following Bass 2005: 240). No evidence for pathology or trauma was identified on the elements.

<u>SK 15</u>

SK 15 is an infant of unknown sex and consists of very fragmented and eroded long bone elements, a clavicle, a rib fragment and a possible phalange.

Bundle #25

Bundle #25 was located on the northeastern boundary of B.C. #3 east of bundles #22, and #23. Three of the four crania present in this bundle were placed on the eastern edge with associated long bones oriented roughly east to west. Four conch shells and a group of shell beads were placed throughout the bundle overlaying the human remains; 2 additional conch shells located on the eastern bundle edge were placed underneath two of the crania. Holder (Book 2:44) describes the bundle:

> [Bundle #25] begins to look as if this burial composed of 4 individuals: adult male, adult female, young child with unerupted molars, [and] infant frags on top of burial. On top [of] burial 4" beads laid in gumbo. One adult male skull intermixed in with long bones beneath the conch found believe skull #3 sexed on basis of bone thickness. Apparently one aged male not previously noted, skull under conch west of skull #3. These beads looked like a mantle of some sort certainly not strung like beads but in a layer which followed contour of bones and then 'spilled' down over sides of bundle.

Remains from one adult female (SK 16) were identified at the SI; age and sex were based on the estimated length of the right femur, the diameter of the humeral head and the overall gracile nature of the remains. In addition to the adult female remains, one left adult clavicle was also present.

<u>SK 16</u>

SK 16 is an adult female consisting of the right and left clavicles, the first cervical vertebra, the right humerus, the right and left radii shafts, the left ulna shaft, the right femur (missing the femoral head), the proximal end and shaft of the right tibia, and the shaft of the left fibula. The diameter of the right humeral head measured 3.5 cm with a length of 31.7 cm. The olecranon fossa was perforated. The right femur measured 43.2 cm in length and the right tibia measured an estimated 36 cm in length. No pathology or trauma was identified on any of the present elements.

Bundle #26

Bundle #26 was located south of bundle #25 and consisted of at least five crania and multiple long bones representing 2 adult females, 2 adult males, 1 child and 1 infant. The human remains are generally oriented to the northwest with the five crania placed on top of and underneath the long bone elements. Holder (Book 2: 47) described this bundle as:

> Radius and ulna in articulation looks like young female, also hand in articulation with it. Cervical vertebra of female skull found at NE corner [of] bundle #26, look as if they were in articulation. Tibia and fibula in articulation-young person. Articulated thorax, lumbar to thoracic vertebra. Ribs in articulation. Femur in acetabulum. Scapula. Probably young or small female. Articulated vertebra sent to lab. Clavicle also in articulation with sternum. Also jaw is in articulation with skull. Condyle at distal end of femur was in contact with tibia.

The presence of articulated elements (articulated vertebra, tibia and fibula, ribs, etc.) indicates that burial occurred with intact connective tissues present to keep bones in anatomical position yet decomposed enough to separate the desired articulated portions from the remaining skeleton. This indicates that elements were likely allowed to decompose (at least partially) before portions were collected for burial in B.C. #3.

Remains from this bundle were recovered in the SI collection but were not attributable to discrete individuals. The remains present include: 1 left tibia (diaphysis only), 1 right tibia (distal end), 1 right fibula (shaft and proximal head), 1 right ulna, 1 mandible (all teeth missing prior to death, total resorption of tooth sockets), and 1 left clavicle. The mandible exhibited more gracile features than robust, but that is likely due to the general degradation of bone and the loss of all the mandibular teeth. MNI for this bundle is at least 1 adult of unknown sex. No additional pathology, trauma or evidence of post mortem processing was identified on any of the present elements.

Bundle #27

Bundle #27 was located northwest of bundle #26 and southeast of bundle #23. Bundle #27 consisted of at least 8 crania, 11 humeri, 10 radii, 5 ulnae, 10 femora, 21 tibiae, and 7 innominate bones making up an MNI of approximately 1 young adult female, 1 young adult (sex ?), 2 adult males, 1 child, and 3 adults of unknown sex. The crania were stacked in the northwest corner of the bundle with the long bones placed on the northeastern bundle edge oriented northeast to southwest.

Nine adult elements from bundle #27 were identified in the SI collection but could not be confidently attributed to discrete individuals. Two right tibiae, 1 left tibia, 2 right radii, 1 un-sided and fragmentary radial shaft, 1 right ulna, 1 left ulna, and 1 left humerus (distal end only) were identified. The left tibia measured approximately 38.8 cm in length and showed evidence of osteoarthritic lipping on the proximal and distal facets. This tibia also had an abnormal fossa on the posterior surface of the proximal shaft. Seven short and shallow cut marks (>1 cm in length) were identified directly above and on the medial epicondyle, and on the medial portion of the shaft of the left humerus. Approximately 3 short and shallow cut marks (>1 cm in length) were identified on the radial tuberosity of the right radius. No additional pathology or trauma was identified on the remaining elements.

Bundle #28

Bundle #28 is located southwest of bundle #27 and consists of both crania and long bones oriented southeast to northwest. Holder identified 3 individuals: 1 child, 1 adult female, and 1 adult male. The original description is as follows (Holder Book 2: 49):

> One small fragment of an infant skull found in [unreadable]. Mandible had [unreadable]. One small tibia was 13 ½ " long classified as a youth. This bundle was incomplete as found. Scattered long bones and conch between bundle #24 and 27 may belong to this bundle #28.

No remains from this bundle were identified at the Smithsonian.

Bundle #29

Bundle #29 was located between bundles #26 and #32 on the northeastern edge of B.C. #3. Crania were placed on both the northeasterly and southwesterly edges of this bundle with the long bones oriented NE to SW and placed in between the sets of crania with one cremation positioned on the eastern boundary of the bundle. At least one conch shell was present in the northwestern corner placed on top of a layer of shell beads. Holder identified at least 4 adult females, 2 adult males, 1 young adult (sex?), 1 infant, and 1 adult (sex?) (Holder Book 2: 49):

> Badly flattened female skull face in good shape, incisors present. 2 male innominates are [located] at northerly end; bundle of 2 skulls at NE corner. Under skull of #2 female badly smashed at time of burial positioned down into underlying area. […] Just southerly from skull cluster of bundle #27 found a nice small chunkey stone lying under the distal end of a tibia of a bundle, which extends beyond B_{70}. Will call this bundle #29. […] Male and female skulls at southerly corner each had depressions above right temporal region as if hit with rounded? instrument.

Unfortunately, no skulls were recovered at the Smithsonian from this bundle to verify Holder's assessment of trauma to the right temporal region of each crania. Remains from one adult female were present for analysis and are described below.

SK 17

SK 17 was identified as an adult female based on the gracile nature of the elements and consists of a right humerus with a perforated olecranon fossa, both the right and left radii, the left clavicle, the left ulna, the right and left femora, and the right and left tibiae. The diameter for the right and left femoral heads measured 4.2 cm and 4.2 cm respectively with femoral lengths measuring 44.5 cm (right) and 44.5 cm (left). Both left and right tibiae measured 36 cm in length. No pathology or trauma was identified on any of these elements.

Bundle #30

Bundle #30 was located west of bundle #29 and east of bundle #27. Holder (Book 2: 52-53) described the excavation and removal of the bones in bundle #30 as confusing and containing multiple disarticulated elements (not all represented on the map) piled on top of one another; during original excavation Holder counted and recorded in his notes at least 6 crania but admits that number is likely conservative for the amount of elements present in the bundle. Nine crania were recorded on the map with what appear to be one articulated arm and one articulated leg (Holder does not mention either of these in the notes). Holder recorded the presence of at least 4 adult females, 4 adult males, 1 infant and 1 unsexed adult. He describes bundle #30 (Book 2: 52-53):

> The Indians helped the confusion since this burial was set to be a real bone heap. Tried to keep track by recording skulls but one or two may have got away without count. Despite the apparent chaos the bundles still show a pattern. #30 was easily distinguished as being a "high" bundle some 2' thick with upper skulls at about el 88'. Bundle flanked along B_{70} with vertically set innoms. The bones were oriented along B_{70} as far as B_{73} ran into a skull cluster of some 5 or 6 skulls I take as part of another bundle. Skulls for #30 were scattered on and under long bone made count confusing and hard to show on drawing. Tried to list bones...I get six skull count but feel there were more.

Twenty-two elements from bundle #30 were relocated in the SI collection and recorded by element and age (see Table 7.4). Sexing features (femoral head, etc.) were not present to aid in confidentially identifying sex for any of the twenty-two disarticulated elements. Based on an MNI using right femora and left tibiae, at least three persons were present in bundle #30. Obviously this is a conservative assessment based on Holder's previous description and original count of crania present in the bundles.

<u>SK 18</u>

I tentatively identified one adult male individual (SK 18) based on general size of the elements and robusticity of muscle attachments; also, this individual was originally identified during a previous assessment of the collection conducted as part of the Smithsonian curatorial process. SK 18 consists of the right radius, left and right ulnae, left and right femora, left and right tibiae, and the left calcaneous. No femoral heads or articular surfaces for any of the present long bones remained intact making sexing difficult. I assessed sex and age based on the robustness of the elements alone: both left and right femora have very pronounced and large pectineal lines and gluteal tuberosities. The left tibia was the most complete element present and measured 39.9 cm in length. Small, shallow cut marks were located on the proximal, medial surface of the right tibia (approximately 7 cut marks < 1.0 cm in length) near the soleal (popiteal) line.

The identification of this individual based on robusticity alone is problematic, however the general size (when compared to the remaining elements) suggests that these remains are part of one discrete individual. Importantly, the identification of this individual does not change the original MNI based on the presence of three right femora.

<u>SK 19</u>

SK 19, a young to mid-adult female (?), consists of a mandible only, with the R M_3, $M_{1,}$ $C_{1,}$ and LM_3 present in the dental arcade. The RM_2 was lost prior to death; the socket was completely resorbed. The left and right M_3 had similar wear patterns (2/3/3/3) and minimal calculus (score of 1) present on the mesial surface of both molars. The canine (score of 4) and RM_1 (3/4/4/4) were moderately worn. A small carie was present on the disto-lingual cusp of the RM_3. The gonial angle was not intact for sexing but the mental eminence scored a 2, suggesting a young to mid-adult female (?) between the ages of 20-30 (Lovejoy et al. 1985).

Bundle #31

Bundle #31 was located southeast of bundle #30 with the long bones oriented roughly west to east, and two complete crania (anterior surface facing up) with the crown of both skulls oriented toward the east. Holder identified at least 2 adult males and one possible adolescent, noting the presence of articulated hands and feet and a pierced bear canine tooth located "east of one of the skulls" (Holder Book 2: 53).

Human remains were relocated at the SI and consist of 1 left humerus, 2 left femora, and 1 left tibia with an MNI of 2 adults (1 male, 1 unknown sex, based on femora). One of the left femora measured 45.9 cm in length (the femoral head was too eroded for a measurement) with some arthritic lipping present on the medial and lateral epicondyles; the right tibia measured 39.4 cm in length with healed periostitis on the lateral proximal surface. A left humerus was also present in the collection (no humeral head measurement, too eroded).

Bundle #32, 33

Bundle #32 and #33 were curated together in the SI collection and also discussed by Holder as part of a larger bundle burial, so I present them together here. Elements from each bundle were designated and analyzed by bundle number. Discrete SK's were not designated in this context and instead an MNI was identified based on repetitive elements for bundle #32 and #33.

Bundle #32 consists of a large number of disarticulated elements located east of bundle #29 with bundle #33 flanking its southwestern border. Bundle #32 consisted of at least 18 crania (18 adults?) located on both the southwestern and northeastern bundle edge. Holder mapped one skull face down. Long bones present in bundle #32 were oriented southwest to northeast with two articulated spinal columns placed perpendicular to the long bones. Four crania (3 adults and 1 child/infant?), multiple long bones oriented roughly north to south and east to west, one disarticulated mandible and a set of 5 ribs were included in bundle #33 (based on Holder's map).

Unfortunately Holder does not describe bundle #33 extensively in his notes but he does provide a description for bundle #32 (Book 2: 54-55):

> A 1'2" thick bundle bones oriented along our B line, 2 conch shells and shell beads. Working fast will list discarded bones and skulls. See lab count for others. Femur in articulation with male innominate. Beads were strung out at random in upper portions of bundle a pocket of cremated bones (human?) 8" diam 3" deep. Other bones not

> scorched had been put in as ash bundle. Looks like had a big adult male an adult female had mandible in articulation. Also youth skull to south had at least 2 gracile individuals, female? and 1 child under 6. At swly corner a male skull with articulated mandible set into underlying child (+ 6 yrs) skull.
>
> Bundle #32 turned out to be a great mass bundle of 15 or so individuals. See lab for count. Removed s.e. corner at very corner a male skull mandible in articulation incisors and canines missing. Also axis-atlas in articulation! (looks sacrifice) Bandaged deformed male skull about 2' west mandible in articulation in matrix to lab. A flexed infant primary lay just westly this last skull, looks sacrifice again. Finally out of the weeds on #32 (2 days!).

Holder's description suggests an MNI of 15 for bundle #32 with at least 1 infant, 1 child (around 6 y.o.), 6 adult females, 4 adult males, and 8 adults of unknown sex. Importantly Holder identifies the infant as a possible sacrifice (although no evidence recorded, nor relocated at the Smithsonian) as well as one adult male (possibly decapitated and relocated at the SI in bundle #33). He also mentioned a "bandaged deformed male skull" possibly suggesting evidence of intentional cranial deformation (this skull was not relocated at the SI).

Bundle #32

In total 46 adult elements from bundle #32 were relocated in the SI collection.   This includes 5 clavicles (2 right, 3 left), 3 humeri (1 right, 2 left), 5 radii (2 right, 3 left), 5 ulnae (2 right, 3 left), 3 lumbar vertebra (#'s 2, 3, 5) and 1 cervical vertebra (the atlas), 8 femora (4 right, 4 left), 10 tibiae (3 right, 7 left), 2 innominate bones (1 right, 1 left), and 1 sacrum (1 left) (see Tables 6.4, 6.9). A MNI based on the tibiae indicate the presence of at least 7 individuals (7 adults of unknown sex); an MNI based on femora indicate the presence of at least 4 individuals (2 adult females, 1 adult male, and 1 adult of unknown sex). The innominate and sacrum (left) represent a younger female, and the additional right innominate represents an older adult female.

<u>Innominate and Sacrum</u>

The left innominate and sacrum represent an adult (25-30 y.o.) female. The sciatic notch of the innominate is wide (score of 1) with a wide, shallow pre-auricular sulcus that extends up the length of the inferior auricular surface; the auricular surface is slightly eroded on the inferior and superior demi-face but overall shows a billowy surface with smooth edges, fine to course granularity and a general youthful appearance (see Buikstra and Ubelaker 1994: 25).

<u>Innominate</u>

This right innominate represents a mid-adult female (35-50 y.o.). The sciatic notch is wide (but narrower than the previously discussed innominate) (score of 2) with a deep and ridged pre-auricular sulcus. Some granularity is present on the upper demi-face of the auricular surface with some striae still present on the inferior demi-face; lipping of the auricular surface edge is present along with activity in the retro-auricular area (Buikstra and Ubelaker 1994: 25).

Bundle #33

In total 45 adult elements from bundle #33 were relocated in the SI collection. This includes 3 crania, 5 mandibles, 9 femora (6 right, 3 left), 8 tibiae (5 right, 3 left), 7 humeri (5 right, 2 left), 6 ulnae (4 right, 2 left), 1 radii (1 right), 2 fibulae (1 right, 1 left), 2 innominate bones (right, 1 male 1 female), 1 scapula (left) and 1 cervical vertebra (atlas) (see Table 6.4). An MNI based on femora indicate the presence of at least 6 individuals (2 adult females(?), 1 adult male(?) and 3 adults unknown sex); the five mandibles indicate the presence of at least 5 adult persons (1 female, 2 males, 2 unknown sex), and the 3 crania indicate the presence of at least 3 individuals (2 adult males and 1 adult female). In addition to these elements, 2 right innominate bones represent 1 young adult female and 1 adult male.

In the following I describe details for the crania, mandibles, and innominate bones present in the collection of remains for bundle #33. Pathologies, and evidence for post-mortem processing of all additional elements is presented in Tables 6.9; please refer to those tables for details on the remaining elements for bundle #33.

Cranium 1

Cranium 1 is an adult male(?) with pronounced brow ridges, supra-orbital margin (score of 3/4), moderately sized mastoid (score of 3/4), and a pronounced occipital protuberance (score of 4). Parietal bossing and two parietal foramen are present on both the left and right parietal bones. The sagittal and occipital sutures are closed but not obliterated (score of 2), but the coronal and temporal sutures are still open (score of 1). Some pinpoint porosity is present on the right parietal near the sagittal suture and on the frontal bone along the supra-orbital ridge. No maxilla or mandible was associated with this cranium.

Cranium 2

Cranium 2 is an adult female with gracile brow ridges, a small mastoid (score of 1), a small occipital protuberance (score of 1) and closed (but still visible) sagittal and occipital sutures (score of 2); the temporal and coronal sutures are still open (score of 1). The cortical bone on this skull was eroded and flakey making identification of pathology (including porosity) difficult. The right mandible was present, but no teeth were recovered. The sockets for the $RM_{1,2,3}$ were completely resorbed indicating anti-mortem tooth loss.

Cranium 3

Cranium 3 is an adult male with pronounced brow ridges (score of 4), a large mastoid (score of 5), and a pronounced occipital protuberance (score of 4). Part of the right and left maxilla was intact with both the right and left molars (1,2,3) still present in the dental arcade. The sagittal, occipital, and coronal sutures are minimally to partially closed (score of 1, 1, 2 respectively). A parietal foramen is present on the right parietal; pinpoint porosity is present on both the right and left parietals near the sagittal suture, on the occipital bone near the occipital suture, and above the supra-orbital ridges. The right and left molars are fairly worn with moderate dentin exposure; calculus (score of 1) is present on the buccal surface of RM_1 and the LM_2.

Three depressed, oval fractures were present on the posterior aspect of the left parietal near the sagittal suture, and on the occipital bone below the lambdoid suture on the left side (Figure 6.4). These three fractures were fairly uniform in shape and size (approximately 1.4 cm in length), exhibit no evidence for bone remodeling and have radiating fractures extending out from the edges of the break. It is very likely that these three fractures resulted from three successive blows to the back of the head by a rounded object with a sharpened bit end; the indentations resemble the bit end of a small Mississippian celt. It is possible that this is the same skull Holder identified in his notes as showing evidence for decapitation (although he noted the skull was present in bundle #32); however no cervical vertebrae were identified with this individual to further support that the cranium was decapitated. The fractures occurred anti-mortem and do not show any sign of bone remolding indicating that the individual died relatively soon after suffering this trauma.

Mandible 1[7]

This mandible is likely from an adult female (?); both the mental eminence (score of 2) and the gonial angle support a tentative identification of female. The teeth show significant wear although some of the enamel was lost post-mortem. Present in occlusion, in the dental arcade are the RM_1, RM_2, Rm_3, $LM_{1,}$ and LM_2 (wear scores of 4/4/4/4, 6/5/4/5, 6/5/6/5, -/4/-/4, 4/4/4/4 respectively). A carie is present in the buccal pit of the RM_1 and a small abscess is present on the buccal aspect below the sockets of the $LM_{1,2}$; the alveolar bone in this area shows porosity and active remodeling. Possible cut marks are oriented horizontally along the

[7] No measurements were taken on any teeth due to time constraints; additionally the data was not necessary for estimating a minimum number of individuals.

bone on the left side of the mandible above the mental foramen; the cut marks are short and shallow and possibly evidence the removal of the mandible from the cranial vault by cutting through the *depressor anguli oris* muscle.

Mandible 2

Mandible 2 (adult, sex?) consists of the midline of the mandible, the left portion of the dental arcade and left ramus. The LM_3 remains in the dental arcade in occlusion (remaining teeth were lost post-mortem). The LM_1 was lost prior to death as the socket is completely resorbed; some porosity is still visible in the area of the former tooth socket suggesting that the bone was not completely healed prior to death. The mental eminence (score of 3) and gonial angle of this mandible are ambiguous to sex. Wear on the LM_3 is mild with rounded cusps still present on the 1, 3, and 4th cusps and the 2nd cusp flattened rather than rounded (score of 3/3/3/4). A small carie is present on the occlusal surface of the disto-lingual cusp (4).

Mandible 3

Mandible 3 (adult, male) consists of a complete mandible with all teeth present and in occlusion. The mental eminence for this individual is fairly pronounced (score of 4) with a flared gonial angle. The teeth show moderate to heavy indicating an older individual (between 30-40 y.o. [Lovejoy et al. 1985]). Some crowding of the right and left mesial and lateral incisors is present. Three caries are present on the R $M_{3,}$ $RM_{1,}$ and the LM_2 with minimal calculus on the buccal, mesial and distal surfaces of the R and L $I_{1,\,2,}$ C_1, $PM_{1,2}$ (score of 2, 2, 2, 2, 3, 2, 1, 1, 1, 1 respectively).

Mandible 4

Mandible 4 is complete representing an adult of undetermined sex. The mental eminence is ambiguous for sex. Teeth present in the mandible include the L/R M_3, L/R M_1, and the RPM_2. The remaining teeth were present at death (the sockets are all open) but lost post-mortem. Two small caries are present on the disto-lingual cusp of the RM_1 and in the buccal pit of the RM_3. No calculus was observed on any of the teeth. Wear patterns are as follow: RM_3 4/3/3/3, RM_1 4/5/5/5, RPM_1 5, LM_1 6/6/5/5, LM_3 3/3/3/3.

Mandible 5

Mandible 5 is very eroded; the mental eminence is fairly prominent (score of 4/5) and the gonial angle is flared suggestive of male. Teeth present and in occlusion include the $RM_{1, 2, 3}$, $RPM_{1, 2}$ and the LM_2; the LM_1 was lost anti-mortem. Three small caries are present on the disto-mesial cusp of the $RM_{2,}$ the buccal-lingual cusp of the RM_1, and the occlusal surface of the LM_2. Calculus is present on buccal, mesial, and distal surfaces of the $RM_{1, 2, 3}$, $RPM_{1, 2}$ at a score of 2 for all teeth. Wear patterns are as follows: RM_3 4/4/4/4, RM_2 4/4/4/4, RM_1 5/4/5/4, RPM_2 4, RPM_1 4, LM_2 4/4/4/4.

Innominate 1

Innominate 1 (right) represents a young adult female. The cortical bone of this element is eroded and flakey, the auricular surface is intact but eroded along the edges. The sciatic notch is wide (score of 1), and the auricular surface is billowy with visible transverse organization and shows very fine granularity with no porosity or striae (see Buikstra and Ubelaker 1994: 25). The iliac crest is not fully fused to the ilium, but is partially joined suggesting an age range of 14-23, which correlates to the age assessment based on the auricular surface (20-24) (Bass 2005: 205).

Innominate 2

Innominate 2 (right) is fragmented and consists of the acetabulum and the auricular surface; the sciatic notch is narrow (score of 4/5) indicating male. The auricular surface shows evidence of lipping along the boundary, porosity on the surface itself, and dense bone. No transverse organization is present and the auricular surface is rough and irregular. These characteristics suggest an age between 40-50 (Buikstra and Ubelaker 1994: 25).

Bundle #34

Bundle #34 is located northwest of bundle #4 and north of primary #1 on the southern corner of B.C. #3. Bundle #34 is not described in Holder's notes but based on the map alone consists of at least 6 crania interred on the southwestern bundle edge with disarticulated long bones (including an articulated lower arm) oriented west to east on the northeastern bundle boundary. Holder's MNI (based on the map) includes 3 adult females, 1 adult male, and 1 adult of unknown sex. Remains from two individuals were recovered and analyzed at the Smithsonian and consist of a young adult of unknown sex, and one adult female (?).

<u>SK 20</u>

A fragmentary right clavicle, a right femur and a left tibia represent SK 20. Several small and shallow cut marks are present on the proximal, lateral and posterior surfaces of the femoral neck near the head and greater trochanter (Table 6.8). The femoral head measures 4.5 cm in diameter and femoral length measures 45.4 cm. The distal epicondyles are joined to the femoral shaft but the epiphyseal line is open on the posterior surface. Following McKern and Stewart (157: 48) the distal epiphyses unite to the femoral shaft between ages 14-20 and "does not become complete for all cases until the 22nd year"; this indicates that this individual was at least 14 y.o. but likely older due to the complete fusion of the epiphyses on the anterior surface. The diameter of the femoral head and the length of the femur are ambiguous to sex (see Bass 2005: 230-231). The left tibia measures 37.1 cm in length and the distal epiphyses are united with the shaft, but like the femur above, not completely fused. The proximal condyles were too eroded to assess stage of fusion. No pathology was evident on any of the present elements.

<u>SK 21</u>

SK 21 consists of the fragmentary remains of the left clavicle, the right ulna, the right radius, the left humerus (no humeral head), the left ulna, the left tibia, the right talus and the right calcaneus of an adult of unknown sex. The only complete element for measurement was the left tibia: 34.7 cm in length. Minimal osteoarthritic lipping is present on the inferior articular surface of the calcaneus and on the corresponding surface of the talus. No other pathology was identified on any of the elements.

Bundle #35

Bundle #35 is located in the center of B.C. #3 to the east of bundle #38 and interior to bundle #30. Holder did not record notes on the excavation of this bundle. MNI was based on the number of crania present on the map: 1 adult female, 2 adult males, and 1 adult of unknown sex. A fragmentary right femoral shaft and a fragmentary right fibula were present in the Smithsonian collection. No pathology was observed on either element. The right femoral shaft was dense and robust.

Bundle #37

Bundle #37 was located north of bundle #7 and interior to bundle #8. Based on the map two conch shells (northwestern edge) were included in this bundle along with 2 crania (1 adult male, 1 adult female) and an estimated 12 long bone elements (2 humeri, 1 ulna, 2 femora, 2 tibiae, 5 unidentified long bones) oriented roughly southwest to northeast. Remains from this bundle were relocated in the Smithsonian and consist of one adult male.

<u>SK 22</u>

SK 22 is an adult male approximately 20-30 y.o. represented by a right humerus, sacrum, left rib, right innominate, and left tibia. The right humeral head measured 4.6 cm in diameter and 33.9 cm in length with a perforated olecranon fossa and a robust brachial tuberosity. The left tibia measured 39.4 cm in length and was fairly robust with pronounced muscle attachments. The sacral bodies were not completely fused (S1-2: 2, S2-3: 3, S3-4: 2, S4-5: 2 [scoring based on McKern and Stewart 1957]) and suggest an age range between 20-30 (Rios et al. 2008), which is supported by the characteristics of the auricular surface of the right innominate that displayed a billowy surface with fine granularity, some minimal pin-point porosity visible on the superior demiface, and no apical or retroauricular activity. The sciatic notch is narrow (score 4/5) indicating male. No pathology or trauma is visible on any of the elements.

Bundle #38

Bundle #38 is a small group of elements oriented northwest to southeast between bundles #20 and #28 and contains 2 crania (1 adult male, 1 adult female), 1 innominate, 1 ulna, 1 tibia, and 1 humerus (estimates from map). None of the remains were relocated at the SI and Holder does not discuss this small bundle in his notes.

Bundle #39

Bundle #39 is between bundles #2 and #33 on the southeastern end of B.C. #3 and contains approximately 15 appendicular skeleton elements and 2 crania. Elements present (estimated from the map) include 2 crania (1 adult male, 1 adult female), 3 femora, 3 tibiae, 3 humeri, 2 radii, 1 fibula, 1 innominate, and 2 ulnae. All the elements are oriented southwest to northeast and both crania were placed on top of the long bone elements in the center of the bundle. One gracile mandible was relocated in the SI collection. All tooth sockets in the dental arcade were either completely resorbed (R/L $M_{1, 2, 3,}$; R/L $PM_{1, 2}$; R C_1, R/L $I_{1, 2}$) or in the process of resorption (L C_1).

Bundle #40

Bundle #40 was located on the southeastern corner of B.C. #3 between bundles #43 and #41 with long bone elements (2 innominate bones, 2 humeri, 4 tibiae, 1 ulna, 1 radius, and 2 fibulae) oriented directly northwest to southeast and four crania present on the northwestern southeastern bundle edges. Skeletal elements from two persons (SK 23 and SK 24) were recovered in the SI collection and represent one young adult (possibly female) and 1 adult of undetermined sex.

SK 23

SK 23 is likely a young adult female represented by an eroded right humeral head, a left humerus (head diameter of 4.1 cm, length 29.7 cm), a left ulna, and a right femur (femoral head eroded; 42 cm in length). The diameter of the left humeral head suggests female (Bass 2005: 152). The epiphyseal union of the left humeral head to the shaft was partially open (score of 1) suggesting a younger individual (between 16-22) (Buiksra and Ubelaker 1994: 43).

SK 24

One right femur (no femoral head) measuring an estimated 44.7 cm in length represents SK 24, an adult of undetermined sex. No pathology or trauma was identified on this element.

Bundle #41

Bundle #41 was located on the southeastern corner of B.C #3 to the southeast of bundle #32 and consists of 4 adult crania and an estimated 4 femora, 3 tibiae, 1 ulna, and 2 fibulae (based on the map). These elements were oriented northwest to southeast with three of the four crania placed on the northwestern boundary of the bundle and the fourth placed on the southeastern corner. None of the elements were located in the SI collection, nor were they described in Holder's notes.

Bundle #42

Bundle #42 was located southeast of bundle #33 and bundle #32 and consisted of 4 conch shells oriented northwest to southeast, a small pile of marine shell disk beads located in the southern corner of the bundle, and 4 crania, 2 innominate bones, 2 clavicles, 2 humeri, 4 unidentified long bones, and 1 articulated spinal column (based on the map). One of the 4 crania appears to be a juvenile or child as open sutures are indicted on the map.

Elements representing 2 (SK 25, SK 26) individuals were relocated in the SI collection along with 3 additional elements that could not be attributed to a discrete person (1 left clavicle, 1 right radius shaft, and 1 cervical vertebra [atlas]).

<u>SK 25</u>

A left fragmented humerus (head and proximal shaft), a left ulna shaft, a right innominate, a right tibia and sternum (xyphoid not fused) represent SK 25: an adult female between the ages of 30-40. The left humeral head measures 3.9 cm in diameter (Bass 2005: 152). The right tibia measures 37.7 cm in length and has a small bony protrusion present above the tibial tuberosity. The sciatic notch of the right innominate is wide (score of 1) with a wide and shallow preauricular sulcus that borders the edge of the inferior demiface. Pinpoint porosity is present on the auricular surface of the inferior and superior demifaces with striations visible on the entire auricular surface. There is a general loss of billowing with a more coarse appearance overall (age 30-40 [Buikstra and Ubelaker 1994: 25]). No additional pathology or trauma was visible on any of the elements.

<u>SK 26</u>

SK 26 is a child between the ages of 3-6. The left femur measures 16.5 cm in length and the distal and proximal epiphyses are not attached; age was based on femur length and the developmental stage of the femur (Fazekas and Koosa 1978).

Bundle #43

Bundle #43 was located on the southeastern boundary of B.C. #3 between bundles #40 and #3. Elements are oriented northwest to southeast with four crania distributed throughout the bundle. This bundle contained 4 crania (1 child or infant), 4 innominate bones, 5 tibiae, 3 femora, 2 humeri, 2 ulnae, 2 radii, 1 fibula and 1 articulated spinal column with associated ribs (identifications based on map).

A total of 19 elements from bundle #43 are curated in the SI. An MNI based on redundant elements indicates the presence of at least 2 adult females, 1 adult male and 1 adult of unknown sex. The 2 adult females were identified based on the presence two femora; the left measuring 43.7 cm in length with a femoral head diameter of 3.9 cm with some osteoarthritic lipping on the facet of distal medial epicondyle, and the right measuring 44.2 cm in length with a femoral head diameter of 4.1 cm. The right femoral head is attached to the diaphyses and the epiphyseal line is closed but not obliterated. The measurements of both femora indicate that these are likely two discrete individuals; the right femur is larger than the left.

The right and left humeri (shaft only) represented 1 adult male; the right humeral head measures 4.7 cm in diameter with a length of 34.5 cm (see Bass 2005: 152). Both humeri have very pronounced brachial tuberosities and roughened muscle attachments.

A left innominate represents one additional older adult, likely a male. The sciatic notch is narrow (score of 3) but somewhat ambiguous to sex. The auricular surface has lost the youthful, billowy surface replaced by few striations and coarse granularity. Microporosity is present on both the inferior and superior demifaces with moderate activity in the retroauricular area and porosity and bony growths on the superior surface of the retroauricular area. These characteristics place this individual in an age range between 35-45 (Buikstra and Ubelaker 1994: 25).

DISCUSSION

As stated at the beginning of this chapter, the analysis of human remains typically engages with demography, pathology, and trauma. These data are important in reconstructing past populations and can become more meaningful when incorporated into the broader relational context of an archaeological site. In particular, the human remains I present here are important to understanding the practice of ridge-top mound construction as it relates to Cahokia's beginnings; this analysis reveals *how* Cahokians engaged with their dead, which is important to understanding how people viewed their world. The processes and actions of burying multiple disarticulated and articulated men, women, and children, all at once may have "valued [bones and bodies] in a new way, perhaps as relics of the ancestral dead" (Fowler 2008: 53). My analysis reveals the relational nature of human remains where the living engaged with the body in order to facilitate its transformation into an ancestor (see Hall 1997).

Demography

Two hundred and one individuals, in total, were recovered from two burial contexts dating to the Terminal Late Woodland/Early Lohmann phase (Sub-mound pit #1/L-shaped building) and the Lohmann/Stirling phase (B.C. #3). Eleven individuals buried in Sub-mound pit #1 consist of the disarticulated remains of at least one adult man (possibly on a/wrapped in a beaded blanket) and multiple children; these children consist of approximately seven disarticulated crania. No other information was recorded for this feature and the remains were not curated with the Smithsonian Institution.

The human remains salvaged and documented from B.C. #3 include a total of one hundred and ninety individuals comprised of 5 extended burials and 185 disarticulated and bundled individuals (see Table 7.2). A total of 60 individuals (58 adults and 2 children) comprise the human remains curated with the SI. Of the 58 adults identified, 20 were recorded as female, 15 as male, and 23 as adults of unknown sex. Of the identified 60 individuals, 26 SKs representing 10 adult females, 9 adult males, 1 infant, 1 child (3-6), and 5 adults of unknown sex were identified in the SI collection (Table 7.7). Of the five extended inhumations 3 are adult females (buried with infant remains) and two are children of undetermined sex. None of the primary burials were male; all age ranges and both sexes were represented throughout B.C. #3.

Pathology and Degenerative Changes

Skeletal pathologies and degenerative changes were present on 17 adult co-mingled elements (of 308) curated at the SI (from B.C. #3). Skeletal pathologies include evidence of infectious disease while degenerative changes include age-related changes to the bone (see Table 7.8) (following Ortner 2003). Seven elements exhibit evidence of infectious disease affecting postcranial elements, 9 elements show sings of degenerative changes, and one element presented with an abnormal bony growth.

Periostitis is the most common pathology present on 6 tibiae from bundles #17, 21 (SK 12), 31, and 33. Periostitis is defined as inflammation of the periosteum and often presents on the shaft of long bones. Healed periostitis is present on four of the six tibiae, with two having active periostitis at the time of death. The presence of active periostitis at the time of death indicates that these two individuals suffered from an infection that may have contributed to their death; however, the type of infection cannot be determined with any confidence as the entire skeleton was not present to be examined for other evidence of infection. Osteomyelitis, infection of the bone or bone marrow, is present on one right adult femur (bundle #1) and was active at the time of death.

Degenerative and metabolic changes to bone were present on 9 elements and include porosity of the cranium (supra-orbital ridges, parietals, and occipital) and minimal osteoarthritic lipping on vertebral bodies and the articular surfaces of the calcaneus, talus, and distal femur (bundles # 3 32, 33, 43) (see Table 7.8). These changes are most likely normal and indicative of change to bone as correlated with age; all degenerative and metabolic changes were observed on elements from adults.

Trauma

Evidence of trauma was documented on one element from B.C. #3 identified in the SI collection: cranium 3 from bundle #33. Cranium 3 is an adult male with three depressed oval-shaped fractures (1.4 cm in length). These fractures were present on the posterior surface of the left parietal near the sagittal suture and on the occipital bone below the lambdoid suture on the left side (see Figure 7.4). Holder (personal notes) originally speculated that this skull was decapitated prior to its inclusion in bundle #33/32. No other evidence for trauma was identified on the elements curated with the SI.

Postmortem Processing

The Wilson Mound B.C #3 human remains consist of 21 elements with evidence of peri/postmortem processing and disarticulation due to natural decomposition (Figure 7.5 for example). For the purposes of this analysis processing of remains was identified as anything (other than taphonomic changes) produced by an instrument that "may incise, cut, chop, dent or crush the bone tissue" (Delabarde and Ludes 2010: 1105). Cut marks were identified as straight, sharp V-shaped incisions made perpendicular or parallel to the external surface of the bone, and were examined macroscopically, with a hand lens, and distinguished by color and texture from rodent gnawing and scratching as well as other taphonomic or excavation related damage (following Ogilvie and Hilton 2000; Raemsch 1993: 224). Typically, cut marks were localized to areas of muscle or ligament attachments and measured between 0.5 cm and 1 cm in length (see Table 7.8). Twenty-one elements (out of 308) presented evidence of disarticulation with several cut marks (between 3 to 15) clustered together indicating multiple 'hacks' or ‘incisions’ at one locale. Evidence for cut marks was recorded and documented with photos and on bone schematics; the anatomical location of the cut marks was documented and recorded by bundle #, SK # and by element (see Table 7.8).

The majority of cut marks are present mostly on appendicular skeletal elements, with the exception of one mandible, and include: 12 femora, 3 ulnae, 3 radii, 1 tibia, and 1 humerus (see Table 7.8). SK 13 in bundle #24 contained a right femur with approximately 15 cut marks ranging in size from 0.5-1.0 cm in length located on the posterior surface of the femoral neck. This area is the location for the attachment of the *obturator externus* muscle that attaches the femur to the surface of the ramus of the ischium (Gray 1918). The presence of cut marks on this portion of the femoral neck suggests intentional removal (by cutting away the muscle tissue) of the femur from the pelvis.

Cut marks were also present on the left tibia of SK 18 (bundle #30) along the popliteal line- an area that gives origin to the *soleus* muscle that extends down the back of the thigh to the heel. It is likely that the removal of this muscle would have detached the tibia from the foot severing the key group of muscles that maintain support for the heel (Gray 1918). The left humerus of bundle #27 also had 7 cut marks (less than 1.0 cm in length each) present on the medial epicondyle of the distal humerus. This is the area of insertion for the *flexor carpi radialis* and *ulnaris,* which attach the humerus to the radius and ulna. The presence of cut marks in this region suggests disarticulation of the humerus from the lower arm. Additionally, a right radius (bundle #27) had 3 cut marks (less than 1.0 cm in length) present on the radial tuberosity, the location for the attachment of the *biceps brachii*. Cut marks were also present along the proximal and distal shafts of 2 ulane and 2 radii (bundle #6/7) at sites of additional muscle and soft tissue attachments (see Table 7.8).

Overall the presence of such cut marks at sites of muscle attachment and articulation points between elements supports the conclusion that these cut marks represent the disarticulation of individuals prior to interment in B.C. #3. George Milner, in his 1982 (p. 284) dissertation, commented on the presence of cut marks on remains from B.C. #3 stating:

> the marks are concentrated around the joints in areas where ligaments attach or where there are tendinous muscle insertions. Several long bone diaphyses also exhibit longitudinal or oblique cut marks, presumably resulting form efforts to clean the bone of adhering soft tissue.

The type of marks present on the B.C. #3 elements support the hypothesis that persons were dismembered and defleshed after death (as opposed to the cut marks indicating a practice of cannibalism or butchery for consumption of the flesh/bone marrow) where "it is logical to infer that a slicing technique, where the edge of the artifact is forced into the skin, is utilized in joint regions consisting of a complex network of muscles, tendons, and ligaments" to disarticulate the body (Raemsch 1993: 227). The presence of more than one v-shaped cut mark concentrated in one area is indicative of needing several cuts to break through tough tissues before proceeding to cleaning the element (Raemsch 1993). The remains discussed above provide evidence of this type of process supporting the conclusion that individuals were processed peri/postmortem with the intention of disarticulating elements and removing soft tissue prior to burial (see Table 7.8).

The practice of defleshing and disarticulating elements is not limited to the Wilson Mound burial context, but the presence of approximately 190 disarticulated individuals buried together in a single house basin is unique. Other contexts in the immediate Cahokian realm that contain disarticulated individuals include the Halliday and Grossmann sites in the Richland uplands, Mound 72, Rattlesnake Mound, and the East St. Louis site (Baires et al. report on file ISAS; Baires and Carbaugh P.C. 2013; Fowler et al. 1999; Baires et al. 2011). Not all elements curated at the SI showed signs of disarticulation in the form of cut marks; however the majority of elements depicted on Holder's map were removed from their respective articulated skeleton prior to burial; this is evidenced by the placement of elements within a bundle (not in anatomical articulation and redundant elements buried together) and the association of both sexes and multiple age groups buried in co-mingled contexts (see Figure 7.2). It is likely that prior to burial in B.C. #3 the 43 bundles of remains included elements from bodies curated in varying states of decomposition- some with flesh, some with minimal flesh, and some without flesh. According to Dirkmaat and Sienickis (1998 [as cited by Pinheiro 2006]) the disarticulation of bodies (when exposed to air) follows a specific chronological sequence: the head is the first to disarticulate from the appendicular skeleton (due to the accessibility of its cavities to insects), followed by the sternum and the clavicle, the upper limbs decompose faster than the lower limbs, the pelvis separates from the torso after the disarticulation of the appendicular skeleton, and the vertebral column is one of the last parts of the body to disarticulate due to the presence of strong ligaments holding the vertebrae in place. Hands and feet are the most vulnerable to disarticulation and are often gone quickly after death. Bodies buried in soil tend to take a longer time (1+ years) to decompose as opposed to bodies exposed to the air and weather (see Mann et al. 1990). The decomposition process for bodies exposed to air, in a warm damp environment like the American Bottom, can occur between 1 to 2 weeks and can result in complete skeletonization. In temperate environs, however, the process can take anywhere between 12-18 months for skeletonization with intact tendons, periosteum, and ligaments, and around 3 years for a 'clean' skeleton (Pinheiro 2006). Depending on the temperature, whether the body was exposed to the air and weather, or buried underground directly impacts the rate of decomposition. Unfortunately for the Wilson Mound remains, there is no evidence to indicate how Cahokian's processed these bodies prior to burial, with the exception of cut marks localized to joints and muscle attachments. Based on the mortuary evidence and the context of the disarticulated elements, it would appear that the remains were exposed to multiple different methods of decomposition and disarticulation that included exposure that resulted in a completely de-fleshed and disarticulated skeleton.

The presence of fleshed individuals in B.C. #3 include the five articulated primary burials; the presence of individuals with minimal flesh (and possibly those exposed to the air during temperate to warm climates) include articulated legs, arms, vertebral columns, and rib cages like those present in bundles 4, 11, 12, 30, 32, 33, 34, 42, and 43; the presence of individuals without flesh (and possibly those exposed to the air during warm and humid climates, or buried for a period of 1 or more years) include individual disarticulated elements, both with and without cut marks (see Figure 7.2). The inclusion of articulated arms and lower limbs suggests the deceased began the process of skeletonization prior to the time of burial, but still had tendons, ligaments, and periosteum intact keeping elements in articulation when interred in B.C. #3. The presence of articulated vertebral columns (as well as crania, and rib cages) indicates elements were likely selected from decomposing bodies prior to the complete skeletonization of the remains; in order to bury an articulated set of vertebrae and ribs, tendons and ligaments must still be intact (see Figure 7.2 bundles #43, 3, and 11 for examples).

Additionally, in bundles 2, 6/7, 32, 33, and 34, multiple bones of the same type were collected and buried together (see Table 7.4). For example, at least 7 left tibiae and 3 right tibiae were buried together in bundle #32; 8 femora (2 left and 6 right) were curated together in bundle #2. Holder documented (on the map) 170 total disarticulated crania buried in B.C. #3 highlighting the selection of specific elements of the body for final burial in Wilson Mound; this selection is likely due to the rate of decomposition as discussed above; since crania and the appendicular skeleton disarticulate from the axial body first, these elements were likely the easiest to accumulate *en mass*. All 43 bundle burials consist of elements gathered from decomposing skeletons indicating an intentional practice of bone curation of like elements from different persons at one time. Regardless of the presence of cut marks, the disarticulated individuals buried in B.C. #3 were processed prior to burial, either naturally through decomposition or by severing limbs and other portions of the body (e.g. mandibles) using knives or other sharpened implements.

Ethnographically, the collecting and burial of disarticulated elements are best known from Iroquoian groups in Canada, groups in the Plains, and the Great Lakes regions (Ubelaker 1974; Ubelaker and Wiley 1978). The example of Huron ossuary burial practices have been recounted by others and used as a point of reference when discussing disarticulation and reburial of individuals in a co-mingled context (see Kidd 1953; Ubelaker 1974). I use these ethnographic accounts here as a starting point for thinking through the complex practices of burial at B.C. #3; my intent is not to draw one to one comparisons between the two groups but rather acknowledge Huron ossuary practice as a point of reference for further inquiry and analysis of these Mississippian period burials.

Huron ossuary practice was documented and recorded on three different occasions by explorer Samuel de Champlain, Jesuit missionary Jean de Brebeuf, and by Father Gabriel Sagard (see Ubelaker 1974: 8; Kidd 1953). All three accounts emphasize the periodicity of the practice (taking place approximately once every 10 years), the 'communal' practice of burial, and the coordination between multiple groups of Huron living in different villages coming together to bury their dead. Additionally, Champlain and de Brebeuf emphasize the practice of excavating individuals from temporary graves, disarticulating (if the are not already) the skeleton, and bundling multiple individuals together for final burial in a circular ossuary pit (Ubelaker 1974: 8; see also Biggar 1929: 160-163). Sagard (Wrong 1939: 211-212) describes the processing of bone collecting and preparation:

> The women who have to bring the bones of their relatives go to the cemeteries for them, and if the flesh is not entirely destroyed they clean it off and take away the bones. These they wash and wrap up in fine new beaver-skins, and with glass beads and wampum necklaces, which the relations and friends contribute.

Additionally, Sagard's description discusses the final burial of these individuals in a large circular pit, which is covered over, mounded up and marked by upright posts. At the time of the ossuary burial, the Huron collected the remains of individuals who had died since the last ossuary ceremony; it was understood that each family was responsible for their dead and the preparation of those remains for final interment. de Brebeuf (Ubelaker 1974: 9; see also Thwaites 1896-1901, X: 285) remarks on the varying degree of preservation, "The flesh of some is quite gone, and there is only parchment on their bones; in other cases, the bodies look as if they had been dried and smoked, and show scarcely any signs of putrefaction; and in still other cases they are still swarming with worms." This statement provides a possible comparison for the varying degree of articulation present in comingled burial contexts, identifying the importance of the timing of the ceremony and the inclusion of the remains regardless of their state of decomposition.

Additionally, bone cleaning/removal of flesh from bone was also documented in the southeast among the Choctaw where 'specialists' traveled through the Choctaw nation with the sole purpose of removing flesh from deceased individuals (Ubelaker 1974: 10). Hernando de Soto supposedly witnessed the curation of disarticulated remains at the village of Cofitachequi (near Savannah River in what is now South Carolina) citing "carved wooden chests containing the remains of dead notables" resting on low benches along the walls of a 'temple' at the center of the village (Hudson 1976: 111). Robert Hall cites the work of archaeologists Barret and Skinner in the early 1920s with Wisconsin Menominee death bundles emphasizing the relationship between pre-Columbian bundles of disarticulated remains and contemporary death bundles containing hair and other materials belonging to the deceased (1997: 29). Hall (1997:

29) quotes a fictional dialogue between an elder and younger Menominee emphasizing this curation of human remains:

> Then, when a man had been dead for six or eight moons, his body was dug from the earth, and the bones stripped and cleaned, or even burned, and the bones or their ashes were kept wrapped in the death bundle until the time appointed, and then deposited in a mound of earth…This was a monument to the dead…

This account was based upon both archaeological and contemporary research focusing on the curation and burial of the dead in an attempt to draw a link between the pre-Columbian remains excavated in the area of the contemporary Menominee reservation.

In the context of the Pawnee, deceased individuals were buried in graves and left to rest, but upon the creation of a Skull Bundle, the living would return to graves and exhume portions of the body; in particular the skull for inclusion in the Skull Bundle. These bundles were curated and cared for by community members with the skull of the deceased individual typically replaced by a wooden replica (Echo-Hawk 1992). In addition, historical accounts of the Mandan, Sioux, Hidatsa and Cheyenne demonstrate mortuary practices that include scaffolding and collecting disarticulated bone elements to be buried later in a secondary context (Ubelaker and Wiley 1978).

The important point of this short recounting of historic period and pre-Columbian mortuary practices is to acknowledge that the practice of disarticulation and defleshing was not unique to Cahokia, and in fact was a somewhat pervasive practice throughout the Eastern Woodlands and the Plains. The processing of the body was intentional. The remains were curated and reburied emphasizing the importance of 'The Ancestors' (Hall 1997: 31). Although the actual processes of disarticulation varied among historic and contact period Native North American communities, "all believed in souls and that such spirit bodies could survive death. Whether there was one or two or more, whether they remained with the bones after death or passed on to a spirit world, whether they could be reborn into new bodies" the act of disarticulation and the burial of these remains in pits or mounds facilitated the commemoration of the spirit and the experience of the afterlife (Hall 1997: 31).

Conclusion

The human remains recovered from Wilson Mound Burial Complex #3 and the sub-mound pit #1 present a unique context within which to examine the relational qualities of ridge-top mound construction and burial practices. Wilson Mound is one of two ridge-top mounds (Mound 72 being the other) where the human remains recovered from the mortuary features were systematically excavated, recorded, and curated. Although mortuary contexts have been identified at Rattlesnake Mound, Powell Mound, Big Mound, Cemetery Mound, and the Great Mound, the human remains from these contexts were never completely excavated or accurately collected and documented (see Chapter 4). Instead, archaeologists, reporters, or general hangers-on documented the burials with ‘grave goods’ biasing the recorded data (this was the late 19th and early 20th centuries after all!). Further, the majority of these remains were destroyed; they were not preserved for additional analyses, curation, or repatriation.

The Wilson Mound collection, then, provides the archaeologist with one of two views into the processing of bodies, the interment of persons, and the inclusion of items like shell beads in these mortuary contexts in relation to ridge-top mound building. This collection of human remains and Holder’s (and Wike’s and Nebgen’s) meticulous notes suggest that the Wilson Mound burials happened quickly, in one event (not unlike the aforementioned Huron ossuary burial events). The process of bringing together pieces of approximately 190 individuals, all at once, at varying stages of decomposition would no doubt have been a powerful experience. The burial of the two women (B.C. #3), one likely very close to giving birth if not deceased during labor, and the other buried with her new born infant placed on her abdomen and her own decapitated cranium under her right arm, further suggest that this event was, if anything, commanding.

Examining this mortuary event within the broader context of contemporaneous ridge-top mound practices (AD 1050-1150) at Cahokia brings us back to Mound 72. Both ridge-tops became the locations of hundreds of buried individuals, some disarticulated, some likely sacrificed, and some interred in contexts with items and materials brought from other communities (e.g. non-local pottery, mica). In fact, Holder notes a possible 'conch blanketed' primary burial located on the early Terminal Late Woodland/Early Lohmann surface (although this was destroyed by a bulldozer) of Wilson Mound, which may have been similar to the falcon-shaped beaded blanket burial at Mound 72. The events at both of these small ridge-tops follow a similar sequence (foundational building, primary mound stages, burial events); they were practiced in the same way. What I mean more specifically is that the living participants in the Wilson Mound burials likely shared a mortuary knowledge with the participants at Mound 72 (not to mention the other ridge-tops that dotted the Cahokia, East St. Louis, St. Louis, and Mitchell site landscapes). There was a process to these events; one that incorporated the movement of bodies, marine shells (beads, cups, and whole shell), projectile points, copper items, and discoidals along with earth, wood, and living persons. In these movements are relationships that constitute a worldview. These relationships are the tangible pieces of a Native American ontology recoverable through the practices of death and burial; "this points to an underlying belief in the supportive, healing, responsive powers of the visionary world…[the] encounter with the numinous is charged with the uncanny sense of potential relationship between the living and the dead" (Irwin 1994: 93, 95).

Figures

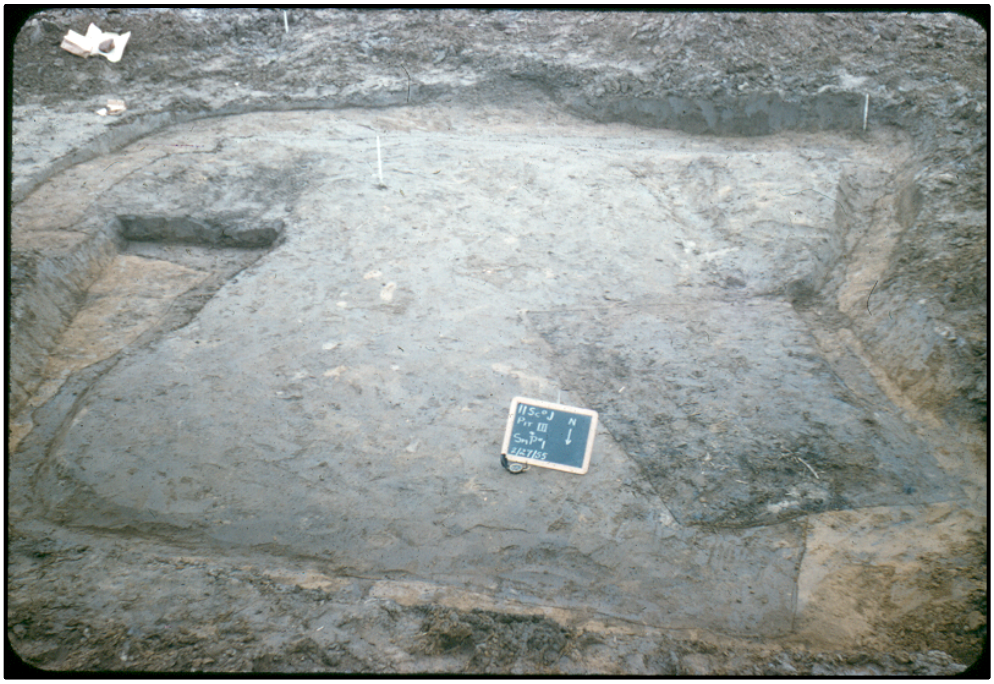

Figure 7.1 Sub-Mound Pit #1 (L-shaped structure), superimposed by Pit #3, view to south (Holder, photograph used with permission UMMA)

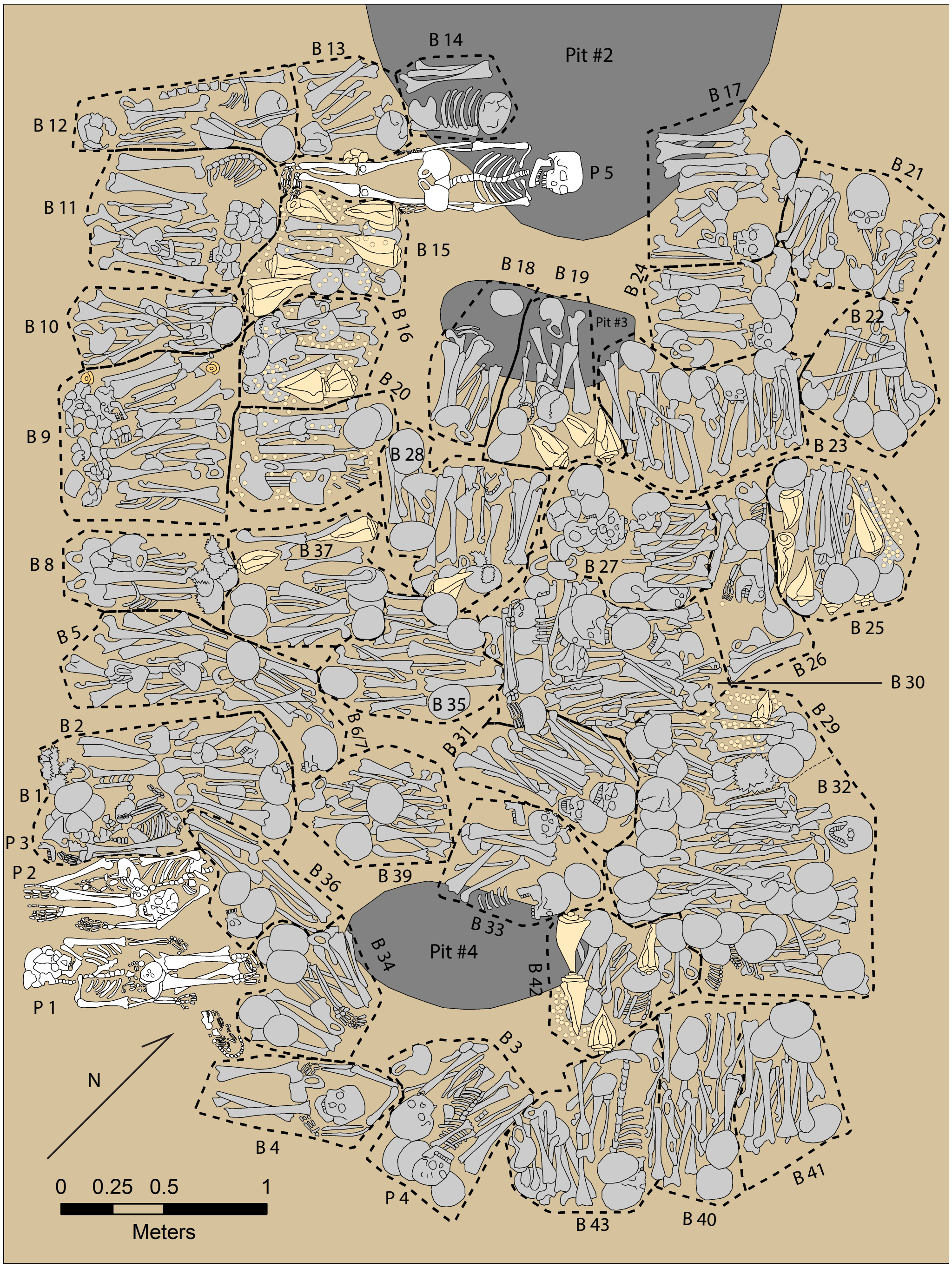

Figure 7.2 Burial Complex #3 Plan Map, P: Primary Burial, B: Bundle Burial, Primary female burials identified in white, whole conch shells and shell beads identified in yellow (re-drawn from Holder, notes on file UMMA)

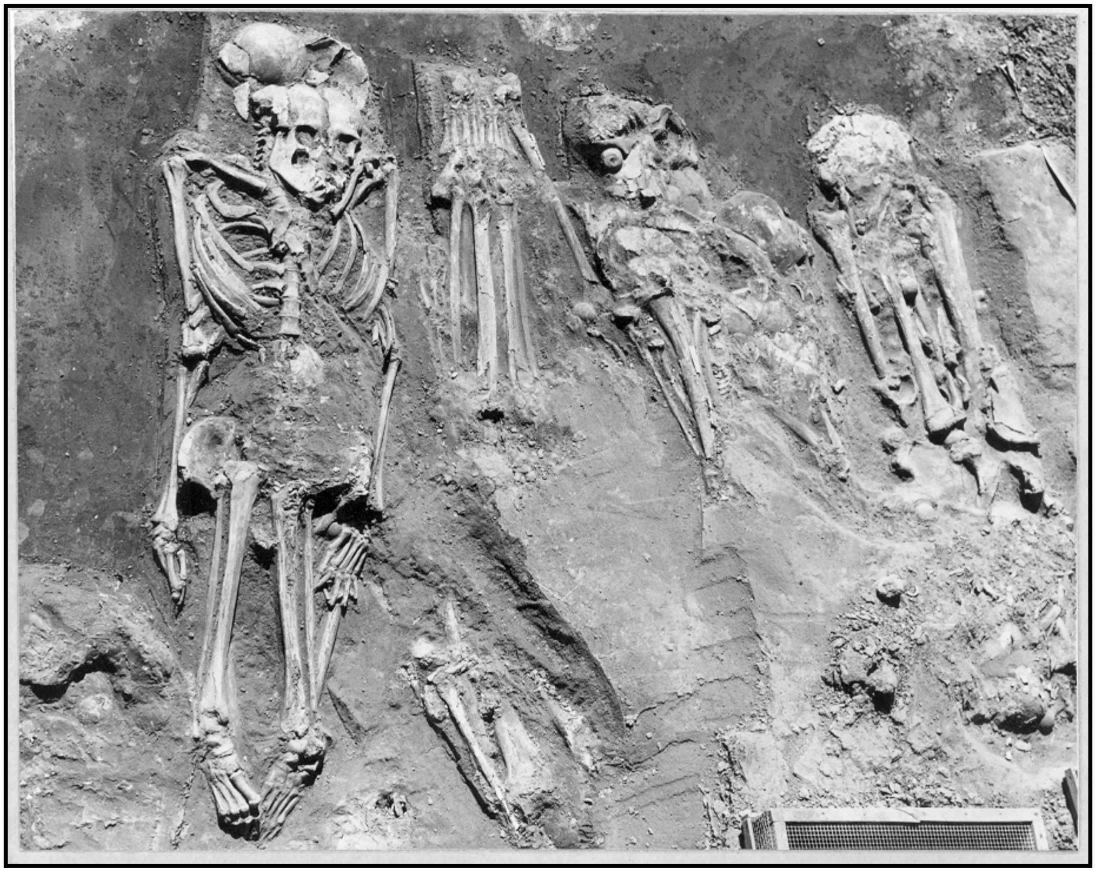

Figure 7.3 Primary #1, Primary #2, Bundle #1 *in situ* Burial Complex #3 (Holder, photograph used with permission UMMA)

Figure 7.4 Cranium #3 showing three depressed fractures (identified by numbers 1, 2, 3) on left parietal and occipital bones, Bundle #33, Burial Complex #3

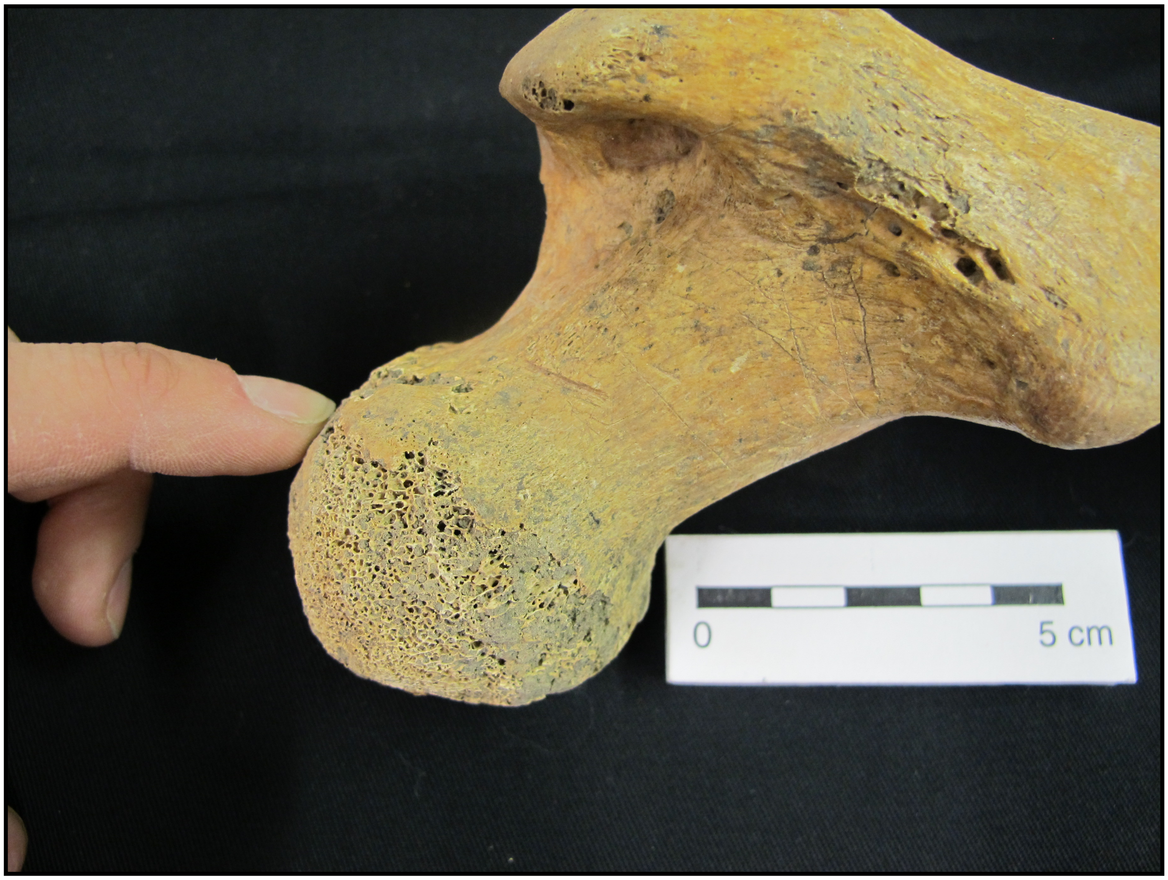

Figure 7.5 Posterior view right femur showing cut marks near femoral head on femoral neck, Bundle #34, Burial Complex #3

Burial Number	Description*
1	-
2	conch blanketed primary, removed with bulldozer
4	piled secondary burial
5	secondary burial

*Source: Holder Notes, Book 1

Table 7.1 Wilson Mound Burial Description, Sub-Mound Pit #1 and Pit #3

Bundle Number	Description	Elements in Bundles	MNI Per Bundle Age/Sex
Primary #1	F supine extended, head to southwest, full-term fetus in utero, skull badly crushed, lengs bent at the knees, 2 copper covered wood earspools with central shell decoration	complete skeleton	1 A/F, 1 I/-
Primary #2	F supine extended, head to northeast, lower legs bent at knees, infant placed between upper legs, skull removed placed under left arm in lower thoracic area	complete skeleton	1 A/F, 1 I/-
Primary # 3	child next to Primary #2, flexed on left side, head to the southwest, likely part of Bundle #1	complete skeleton	1 C/-
Primary # 4	child, flexed on right side, head to south on top of Bundle # 3	complete skeleton	1 C/-
Primary # 5	F supine extended, head turned to left oriented toward the northeast, fragments of infant skull alongside left knee fragments of infant ribs under pelvis	complete skeleton	1 A/F, 1 I/-
Bundle # 1	bundled bones oriented E-W	3 crania, 1 femur, 1 innominate	3 A/?
Bundle # 2	bundled bones oriented E-W	4 crania, 1 infant complete skeleton, 1 innominate, 11 long bones	3 A/F, 1 A/M, 1 I/-
Bundle # 3	pile of 4 skulls with associated bundle of long bones oriented SW-NE	4 crania, 1 innominate, 12 long bones	1 A/F, 1 A/M, 1 Y.A./-, 1 A/-
Bundle # 4	ligatured young adult,oriented E-W, covered partly by dog burial	complete skeleton	1 Y.A./F
Bundle # 5	bundled bones, oriented E-W	3 innominate, 1 clavicle, 2 radii, 1 scapula, 2 femur, 1 tibia, phalanges and carpals	1 A/M, 1 A/F, 1 Y.A./-
Bundle # 6/7	bundled bones, oriented E-W	1 crania, 2 innominate, 4 femora, 3 ulnae, 3 tibiae, 2 radii, 1 mandible, 4 fibulae	1 A/M
Bundle # 8	bundled bones, oriented E-W	3 innominate, 4 ribs, 1 crania, 2 femora, 2 ulnae, 2 fibulae	3 A/?
Bundle # 9	bundled bones, oriented E-W with copper covered ear spool associated with male skull, small bird buried amidst bundled long bones	5 crania, 2 mandible, 5 femora, 4 fibulae, 4 innominate, 1 scapula, 1 clavicle, 4 humeri, 3 ulnae, 1 tibia, 3 radii, partial spinal column, 4 ribs, phalanges	2 A/M, 2 A/F, 1 I/-
Bundle # 10	bundled bones oriented E-W in bad preservation	3 crania, 1 innominate, 6 femora, 2 tibiae, 2 fibulae, 2 humeri, 3 ulna, 1 mandible	2 A/F, 1 A/M, 1 C/-
Bundle # 11	bundled bones oriented E-W, partially articulated child, on large adult male with a female mandible placed inside the large male mandible	3 skulls, 5 mandibles, 4 innominate, 2 clavicles, 4 humeri,3 radii, 1 ulna, 4 tibiae, 1 fibula, 1 calcaneous	2 A/M, 2 A/F, 1 C/-
Bundle # 12	bundled bones, oriented E-W	4 skulls, 1 clavicle, 2 mandibles, 2 radii, 4 femora, 1 innominate, 2 tibiae, 1 fibula	1 Y.A./M, 2 A/F
**Bundle # 13	bundled bones in bad preservation, no recovered elements	1 cranium, 1 tibia, 2 femora, 1 humerus, 1 ulna, 1 innominate	1 A/M, 1 A/F, 1 C/-
Bundle # 14	bundled bones, oriented E-W	1 cranium, 1 mandible, 2 ulnae, 2 innominate, 1 femur, 1 tibia, 2 fibulae	1 A/F
Bundle # 15	bundled bones oriented E-W covered over/wrapped in > 1,000 finished/unfinished marine shell disk beads (strung together to form a blanket/shroud), 5 conch shells laid directly on bones with distal ends toward the east; "the observations of and specimens of this bundle are inadequate b/c of all those damned beads and collumellas" (Book #2: 30)	2 crania, 2 mandibles, 1 innominate, 1 humerus, 2 radii, 1 femur, 2 tibiae,	1 A/M, 1 A/F, 1 A/?
**Bundle # 16	bundled bones oriented E-W covered over/wrapped in marine shell disk beads w/at least 3 conch shells	4 crania, 3 innominate, 3 femora, 2 tibiae, 1 fibula, 1 mandible	2 A/F, 1 A/M, 1 C/-
Bundle # 17	bundled bones oriented E-W lying flat on gumbo clay surface, bones badly crushed	3 crania, 3 mandibles, 1 clavicle, 2 scapulae, 7 humeri, 1 radius, 2 ulnae, 6 innominate, 10 femora, 2 tibiae, 4 fibulae	1 A/M, 1 A/F, 1 C/-
Bundle # 18	bundled long bones oriented N-S	2 innominate, 1 ulna, 2 tibia, 2 radii, 2 humeri, 2 femora, 1 fibula, 2 patella, 2 scapulae	1 A/M
Bundle # 19	bundled bones oriented N-S, 2 conch shells in southeast corner oriented E-W	4 crania, 2 scapulae, 2 mandibles, 6 humeri, 4 ulnae, 2 radii, 4 femora, 2 tibiae, 4 fibulae	1 A/F, 1 A/?, 2 A/M
**Bundle # 20	bundled bones oriented E-W, covered with layers of marine shell disk beads	2 crania, 2 innominate, 2 femora, 2 ulnae, 2 tibiae, 4 unidentified elements	1 A/F, 1 A/M, 1 Y.A./?
Bundle # 21	bundled bones oriented N-S	4 crania, 2 mandibles, 4 humeri, 4 innominate, 2 fibulae, 4 ulnae, 5 radii, 2 clavical, 4 femora, 2 tibiae,	1 A/M, 1 A/F, 1 C/-, 1 Y.A./-
Bundle # 22	bundled bones oriented N-S	4 crania, 5 humeri, 2 radii, 5 mandibles, 1 scapula, 2 clavical, 2 innomiate, 8 tibia, 6 femora, 5 fibulae	3 A/F, 3 A/M
Bundle # 23	bundled bones oriented N-S	5 crania, 3 mandibles, 12 humeri, 5 radii, 5 ulnae, 5 innominate, 5 femora, 9 tibiae, 12 fibulae	2 A/F, 2 A/M, 1 I/-
Bundle # 24	bundled bones oriented E-W	5 crania, 2 mandbiles, 4 humeri, 5 radii, 4 ulnae, 2 innominate, 5 femora, 5 tibiae, 4 fibulae, 1 clavical	3 A/F, 2 A/M, 1 C/-
Bundle # 25	bundled bones oriented E-W, covered with layers of marine shell disk beads (not strung together), at least 6 conch shells oriented distal end N	4 crania, 3 mandibles, 1 innominate, 1 scapula, 1 clavicle, 2 humeri, 3 radii, 1 ulna, 6 femora, 5 tibiae, 6 fibulae	2 A/M, 1 A/F, 1 C/- 1 I/-
Bundle # 26	bundled bones oriented E-W and N-S, articulated portions of at least one female	5 crania, 2 clavicles, 1 mandible, 3 humeri, 4 ulna, 4 radii, 1 scapula, 7 femora, 4 tibiae, 3 fibulae, 3 innominate	2 A/F, 2 A/M, 1 .C/-., 1 I/-
Bundle # 27	bundled bones oriented E-W, bone in bad condition	8 crania, 11 humeri, 10 radii, 5 ulnae, 10 femora, 21 tibiae, 7 innominate	1 Y.A./F, 1 Y.A./-, 2 A/M, 1 C/-, 3 A/?

Table 7.2 Wilson Mound Burial Descriptions and Minimum Number of Individuals, Burial Complex #3

Bundle # 28	bundled bones oriented N-S	1 crania, 2 innominate, I mandible/maxilla, 1 scapula, 1 humerus, 3 femora, 4 tibiae, 1 fibula	1 C/-, 1 A/F, 1 A/M
Bundle # 29	bundled bones oriented E-W, marine shell disk beads in northeasterly corner, collection of skulls bundled in northeasterly corner, one conch shell distal end N, evidence of trauma on male and female crania	8 crania, 3 mandible, 2 humeri, 1 radius, 7 innominate, 12 tibiae, 1 fibulae, 3 femora	4 A/F, 2 A/M, 1 Y.A./?, 1 I/-, 1 A/?
Bundle # 30	bundled bones oriented E-W, N-S, at least one articulated L arm and one articulated ? leg, MNI count is conservative	9 crania, 4 humeri, 5 ulnae, 1 radius, 4 innominate, 2 femora, 3 fibulae	4 A/F, 4 A/M, 1 I/-, 1 A/?
Bundle # 31	bundled bones oriented NW-SE, associated with B#30, one bear tooth pendant in southeast corner, at least 2 articulated lower legs, MNI count is conservative	2 crania, 2 fibulae, 1 ulna, 2 humeri, 4? tibiae	2 A/M, 1 C/-
**Bundle # 32	bundled bones oriented E-W, associated with B#29, 2 conch shells and strung marine shell disk beads placed at random, 1 cremation (8" diameter), 1 fully flexed infant, MNI count is conservative	19 crania, 1 partially articulated spinal column with ribs, 2 innominate, 4 ulnae, 2 radii, at least 8 tibiae, 5 femora, 1 complete infant skeleton	6 A/F, 4 A/M, 8 A/?, 1 C (<6)/-, 1 I/-
**Bundle # 33	bundled bones oriented E-W	4 crania, 1 mandible, 5 articulated ribs, 1 femur, 2 tibiae, 1 humerus, 1 radius	4 A/?
**Bundle # 34	bundled bones oriented NW-SE, 1 articulated R? arm	5 crania, 1 articulated R? arm, 2 innominates, 3 tibiae, 1 ulna, 1 humerus, 1 femur	3 A/F, 1 A/M, 1 A/?
**Bundle # 35	bundled bones oriented E-W	7 crania, 2 humeri, 1 radius, 3 ulnae, 3 femora, 3 tibiae, 4 fibulae	1 A/F, 2 A/M, 4 A/?
**Bundle # 37	bundled bones oriented E-W, 2 conch shells oriented E-W	2 crania, 2 humeri, 1 ulnae, 2 femora, 2 tibiae, 5 ? long bones	1 A/F, 1 A/M
**Bundle # 38	bundled bones oriented N-S	2 crania, 1 innominate, 1 ulna, 1 tibia, 1 humerus	1 A/F, 1 A/M
**Bundle # 39	bundled bones oriented E-W	2 crania, 3 femora, 3 tibiae, 3 humeri, 2 radii, 1 fibula, 1 innominate, 2 ulnae	1 A/F, 1 A/M
**Bundle # 40	bundled bones oriented N-S	4 crania, 2 innominate, 2 humeri, 4 tibiae, 1 ulna, 1 radius, 2 fibulae	4 A/?
**Bundle # 41	bundled bones oriented N-S	4 crania, 4 femora, 3 tibiae, 1 ulna, 2 fibulae	4 A/?
**Bundle # 42	bundled bones oriented N-S, 4 conch shells oriented N-S, marine shell disk beads pilled in the southwesterly corner, 1 articulated spinal column with ribs, possibly 1 Y.A. skull	4 crania, 2 innominate, 2 clavicles, 2 humeri, 4 ? long bones, 1 articulated spinal column with ribs	3 A/?, 1 Y.A./?
**Bundle # 43	bundled bones oriented N-S, 1 infant skull in northern section of bundle, 1 articulated adult cranium, spine, and ribs	4 crania, 4 innominate, 5 tibiae, 3 femora, 2 humeri, 2 ulnae, 2 radii, 1 fibula, 1 articulate spinal column with ribs	3 A/?, 1 I/-
		TOTAL MNI 190 Individuals:	56 A/F, 50 A/M, 10 I/-, 14 C/?, 45 A/?, 7 Y.A./?, 2 Y.A./F, 1 Y.A./M

F- female, M-male, I-infant, C-child, Y.A.- young adult, A- adult, N/A- not applicable
Descriptions and Minimum Number of Individuals (MNI) are from Holder's notes on Archaeological Data Sheets and in field Books 1 & 2
*** information collected from map (see Figure 6.1), not Holder notes*

Table 7.2 continued

Bundle Number	Holder MNI Age/Sex	Smithsonian MNI Age/Sex
Primary #1	1 A/F, 1 I/-	1 A/F, 1 I/-
Primary #2	1 A/F, 1 I/-	NP
Primary # 3	1 C/-	20-29/F
Primary # 4	1 C/-	NP
Primary # 5	1 A/F	NP
Bundle # 1	3 A/?	1 A/F, 2 A/?
Bundle # 2	3 A/F, 1 A/M, 1 I/-	1 A/M, 1 A/F, 5 A/?
Bundle # 3	1 A/F, 1 A/M, 1 Y.A./-, 1 A/-	1 A/M, 1 Y.A./?
Bundle # 4	1 Y.A./F	NP
Bundle # 5	1 A/M, 1 A/F, 1 Y.A./-	1 A/M
Bundle # 6/7	1 A/M	1 A/M, 5 A/?, 1 A/F
Bundle # 8	3 A/?	1 A/F
Bundle # 9	2 A/M, 2 A/F, 1 I/-	NP
Bundle # 10	2 A/F, 1 A/M, 1 C/-	NP
Bundle # 11	2 A/M, 2 A/F, 1 C/-	NP
Bundle # 12	1 Y.A./M, 2 A/F	1 A/M
Bundle # 13	1 A/M, 1 A/F, 1 C/-	NP
Bundle # 14	1 A/F	NP
Bundle # 15	1 A/M, 1 A/F	NP
**Bundle # 16	2 A/F, 1 A/M, 1 C/-	1 A/F
Bundle # 17	1 A/M, 1 A/F, 1 C/-	1 A/M, 1 Y.A./F
Bundle # 18	1 A/M	1 A/F?
Bundle # 19	1 A/F, 1 A/?, 2 A/M	NP
**Bundle # 20	1 A/F, 1 A/M, 1 Y.A./?	NP
Bundle # 21	1 A/M, 1 A/F, 1 C/-, 1 Y.A./-	1 A/M
Bundle # 22	3 A/F, 1 A/M	1 A/F
Bundle # 23	2 A/F, 2 A/M, 1 I/-	1 A/M?
Bundle # 24	3 A/F, 2 A/M, 1 C/-	1 A/M, 1 Y.A./?, 1 I/?
Bundle # 25	2 A/M, ! A/F, 1 C/- 1 I/-	1 A/F; 1 A/?
Bundle # 26	2 A/F, 2 A/M, 1 Y.A./-., 1 I/-	1 A/?
Bundle # 27	1 Y.A./F, 1 Y.A./-, 2 A/M, 1 C/-, 3 A/?	2 A/?
Bundle # 28	1 C/-, 1 A/F, 1 A/M	NP
Bundle # 29	4 A/F, 2 A/M, 1 Y.A./?, 1 I/-, 1 A/?	1 A/F
Bundle # 30	4 A/F, 4 A/M, 1 I/-, 1 A/?	1 A/M, 1 A/F, 1 A/?
Bundle # 31	2 A/M, 1 C/-	1 A/M, 1 A/?
Bundle # 32	6 A/F, 4 A/M, 8 A/?, 1 C (<6)/-, 1 I/-	1 A/M, 2 A/F, 1 A/?
Bundle # 33	4 A/?	2 A/F?, 1 A/M?, 3 A/?
**Bundle # 34	3 A/F, 1 A/M, 1 A/?	1 A/F?, 1 A/?
**Bundle # 35	1 A/F, 2 A/M, 4 A/?	1 A/?
**Bundle # 37	1 A/F, 1 A/M	1 A/M
**Bundle # 38	1 A/F, 1 A/M	NP
**Bundle # 39	1 A/F, 1 A/M	1 A/?
**Bundle # 40	4 A/?	1 A/?, 1 A/F?
**Bundle # 41	4 A/?	NP
**Bundle # 42	3 A/?, 1 Y.A./?	1 A/F, 1 C/?
**Bundle # 43	3 A/?, 1 I/-	1 A/M, 2 A/F, 1 A/?
	TOTALS:	**20 A/F, 15 A/M, 23 A/?, C/?**

MNI by Bundle based on Holder notes; repetative elements and identifiable SK's from Smithsonian Collection
F- female, M-male, I-infant, C-child, Y.A.- young adult, NP- not present
*** Estimates, taken directly from the map*

Table 7.3 Comparison of Minimum Number of Individuals from Holder's Records and Smithsonian Institution Collections, Burial Complex #3

Bundle Number	Skull	Parietal	Occipital	Frontal	Maxilla	Mandible	Sternum	Scapula
Bundle # 1	-					-	-	-
Bundle # 2	-					1	-	-
Bundle # 3	-					-	-	-
Bundle # 5	-					-	-	-
Bundle # 6/7	-					-	-	-
Bundle # 8	-					-	-	-
Bundle # 12	-	-	1	-	-	0/1	-	-
Bundle # 16	-	-	-	-	-	1	-	-
Bundle # 17	-	-	-	-	-	-	-	-
Bundle # 18	-	-	-	-	-	-	1	-
Bundle # 21	-	-	-	-	-	-	-	-
Bundle # 22	-	-	-	-	-	-	-	-
Bundle # 23	-	-	-	-	-	1	-	-
Bundle # 24	-	-	-	-	-	-	-	-
Bundle # 25	-	-	-	-	-	-	-	-
Bundle # 26	-	-	-	-	-	1	-	-
Bundle # 27	-	-	-	-	-	-	-	-
Bundle # 29	-	-	-	-	-	-	-	-
Bundle # 30	-	-	-	-	-	1	1	0/1
Bundle # 31	-	-	-	-	-	-	-	-
Bundle # 32	-	-	-	-	-	-	-	-
Bundle # 33	3	-	-	-	-	5	-	1/0
Bundle # 34	-	-	-	-	-	-	-	-
Bundle # 35	-	-	-	-	-	-	-	-
Bundle # 37	-	-					-	-
Bundle # 39	-	-	-	-	-	1	-	-
Bundle # 40	-	-	-	-	-	-	-	-
Bundle # 42	-	-	-	-	-	-	1	-
Bundle # 43	-	-	-	-	-	-	-	-
TOTAL (all bundles)	3		1			12	3	1

Number of elements listed as Left/Right, '-' unobservable/not present, '?' side unknown

Table 7.4 Minimum Number of Individuals (MNI) by Bundle, B.C. #3 Wilson Mound Young Adults- Adults (15 y.o. +)

Clavicle	Humerus	Radius	Ulna	Innomiante	Femur	Tibia	Fibula	***Total (by bundle)***
-	1/1	-	2/0	1/0	1/1	1/1	1/0	2
-	4/1	1/0	2/2	-	2/6	1/3	-	4
0/1	2/1	1/1	1/1	-	0/1	1/0	-	2
-	-	-	-	-	0/1	-	-	1
-	2/3	5/5	3/3	1/2	2/3	1/0	1/0	5
-	-	-	-	-	1/1	1/1	0/1	1
-	1/1	0/1	1/2	-	1/1	0/1	0/1	2
-	-	-	-	-	-	-	-	1
-	0/1	-	-	-	2/2	2/0	-	2
0/1	1/1	0/1	-	-	-	1/0	-	1
-	1/1	1/1	1/1	-	1/0	1/1	-	1
-	-	-	-	-	1/0	1/1	-	1
-	-	-	-	-	-	-	-	1
-	-	-	-	-	2/2	2/2	1/1	2
2/1	0/1	1/1	1/0	-	0/1	0/1	1/0	2
1/0	-	-	0/1	-	-	1/1	0/1	1
-	1/0	1/2	1/1	-	-	1/2	-	2
-	0/1	0/1	1/0	-	1/1	1/2	-	2
0/2	1/1	0/1	2/2	-	1/3	3/2	-	3
-	1/0	-	-	-	2/0	0/1	-	2
3/2	2/1	3/2	3/2	1/1	4/4	7/3	3/1	7
-	2/5	0/1	2/4	0/2	3/6	3/5	-	6
1/1	1/0	0/1	1/0	-	0/1	2/1	-	2
-	-	-	-	-	0/1	-	0/1	1
-	0/1	-	-	0/1	-	1/0	1/1	1
-	-	-	-	-	-	-	-	1
-	1/1	-	1/0	-	1/1	-	-	1
1/0	1/0	0/1	1/0	0/1	1/0	0/1	-	1
2/0	2/1	1/1	1/0	1/0	2/1	1/1	1/0	2
10	24/23	14/20	24/19	4/7	28/37	32/30	9/7	58

Table 7.4 continued

	Primary #1	*Primary #2*	*Primary #3*	*Primary #4*	*Primary #5*
	SI	*PH*	*PH*	*PH*	*PH*
Element	Left / Right	Left / Right	Left / Right	Left / Right	Left / Right
Cranium (overall)	2	P	P	P	P
Parietal	-/3	-	-	-	-
Frontal	2	-	-	-	-
Occipital	3	-	-	-	-
Temporal	-/-	-	-	-	-
Mandible	2	P	-	-	P
Clavicle	1/1	P/P	-	-	P/P
Sternum	2	A	-	-	-
Scapula	2/2	A/P	-	P	-
Ribs (#)	6/6	3/6	-/7	5	6/6
Vertebra (#)	14	12	5	-	17
cervical	7	3	5	-	4?
thoracic	7	9	0	-	9?
lumbar	0	0	0	-	4?
Humerus	1/1	P/P	-/P	P/P	P/P
Radius	1/1	P/P	-/P	-	P/P
Ulna	1/1	P/P	-/P	-	P/P
Carpals (#)	-	P	-	-	P
Metacarpals (#)	-	P	-	-	P
Femur	1/1	P/P	-/P	-	P/P
Patella	2/2	-	-	-	P/P
Tibia	2/1	P/P	-/P	-	P/P
Fibula	-/1	-	-	-	A/P
Pelvis	-/-	-/P	-/P	P	P/P
Tarsals	-	P	-	-	P
Metatarsals	-	P	-	-	P
Permanent teeth (#)		-	-	-	-
maxillary	0	-	-	-	-
mandibular	14	-	-	-	-

Preservation: 1 > 75% present; 2= 25-75%; 3 < 25%
P: present; A: Absent; '-':unobservable
SI: Data collected from Smithsonian Institution
PH: Data collected from Preston Holder's notes

Table 7.5 Skeletal Inventory of Primary Burials #1, 2, 3, 4, and 5, Burial Complex #3

Bundle Number	Skull	Parietal	Occipital	Frontal	Maxilla	Mandible	Sternum	Scapula
Bundle # 1	-	-	-	-	-	-	-	-
Bundle # 2	-	-	-	-	-	-	-	-
Bundle # 3	-	-	-	-	-	-	-	-
Bundle # 5	-	-	-	-	-	-	-	-
Bundle # 6/7	-	-	-	-	-	-	-	-
Bundle # 8	-	-	-	-	-	-	-	-
Bundle # 12	-	-	-	-	-	-	-	-
Bundle # 16	-	-	-	-	-	-	-	-
Bundle # 17	-	-	-	-	-	-	-	-
Bundle # 18	-	-	-	-	-	-	-	-
Bundle # 21	-	-	-	-	-	-	-	-
Bundle # 22	-	-	-	-	-	-	-	-
Bundle # 23	-	-	-	-	-	-	-	-
Bundle # 24	-	-	-	-	-	-	-	-
Bundle # 25	-	-	-	-	-	-	-	-
Bundle # 26	-	-	-	-	-	-	-	-
Bundle # 27	-	-	-	-	-	-	-	-
Bundle # 29	-	-	-	-	-	-	-	-
Bundle # 30	-	-	-	-	-	-	-	-
Bundle # 31	-	-	-	-	-	-	-	-
Bundle # 32	-	-	-	-	-	-	-	-
Bundle # 33	-	-	-	-	-	-	-	-
Bundle # 34	-	-	-	-	-	-	-	-
Bundle # 35	-	-	-	-	-	-	-	-
Bundle # 37	-	-	-	-	-	-	-	-
Bundle # 39	-	-	-	-	-	-	-	-
Bundle # 40	-	-	-	-	-	-	-	-
Bundle # 42	-	-	-	-	-	-	-	-
Bundle # 43	-	-	-	-	-	-	-	-
TOTAL (all bundles)								

Number of elements listed as Left/Right, '-' not present, '?' side unknown

Table 7.6 Minimum Number of Individuals (MNI) by Bundle,B.C. #3 Wilson Mound Infant/Child

Clavicle	**Humerus**	**Radius**	**Ulna**	**Innomiante**	**Femur**	**Tibia**	**Fibula**	***Total (by bundle)***
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
1?	-	-	-	-	-	-	-	1
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	1/-	-	-	1
-	-	-	-	-	-	-	-	-
								2

Table 7.6 continued

	Bundle #1	*Bundle #2*	*Bundle #2*	*Bundle #3*	*Bundle #3*	*Bundle #6/7*	*Bundle #8*	*Bundle #12*
	SK 1	*SK 2*	*SK 3*	*SK 4*	*SK 5*	*SK 6*	*SK 7*	*SK 8*
	20-29/F	*20-30/M*	*Adult/F*	*Adult/M*	*14-17/?*	*Adult/M*	*16-20/F*	*25-35/M*
Element	Left / Right	Left / Right	Left / Right	Left / Right	Left / Right	Left/Right	Left/Right	Left/Right
Cranium (overall)	-	-	-	-	-	-	-	3
Parietal	-	-	-	-	-	-	-	-
Frontal	-	-	-	-	-	-	-	-
Occipital	-	-	-	-	-	-	-	1
Temporal	-	-	-	-	-	-	-	-
Mandible	-	1	-	-	-	-	-	-/1
Clavicle	-	-	-	-	2/-	-	-	-
Sternum	-	-	-	-	-	-	-	-
Scapula	-	-	-	-	-	-	-	-
Ribs (#)	-	-	-	-	-	-	-	-
Vertebra (#)	-	-	-	-	-	-	-	-
cervical	-	-	-	-	-	-	-	-
thoracic	-	-	-	-	-	-	-	-
lumbar	-	-	-	-	-	-	-	-
Humerus	-	-	-	2/1	1/-	1/-	-	2/2
Radius	-	-	-	1/1	-	1/1	-	-/2
Ulna	-	-	-	1/1	-	1/1	-	2/-
Carpals (#)	-	-	-	-	-	-	-	-
Metacarpals (#)	-	-	-	-	-	-	-	-
Femur	-	-	1/1	-/1	-	-/1	-/1	2/2
Patella	-	-	-	-	-	-	-	-
Tibia	1/1	-	-	1/-	-	-	1/1	-/3
Fibula	-	-	-	-	-	-	-/1	-/2
Pelvis	2/-	-	-	-	-	-	-	-
Tarsals	-	-	-	-	-	-	1/-	-
Metatarsals	-	-	-	-	-	-	-	-
Permanent teeth	-	8	-	-	-	-	9	2
maxillary	-	-	-	-	-	-	9	-
mandibular	-	8	-	-	-	-	-	2

Preservation: 1 > 75% present; 2= 25-75%; 3 < 25%
'-':unobservable/not present

Table 7.7 Skeletal Inventory SK's by Bundle #,B.C. #3 Wilson Mound

Bundle #17	Bundle #17	Bundle #18	Bundle #21	Bundle #24	Bundle #24	Bundle #24	Bundle #25	Bundle #29
SK 9	*SK 10*	*SK 11*	*SK 12*	*SK 13*	*SK 14*	*SK 15*	*SK 16*	*SK 17*
Adult/F	*Adult/M?*	*Adult/F*	*Adult/M?*	*Adult/M*	*14-20/?*	*Infant/?*	*Adult/F*	*Adult/F*
Left/Right	Left/Right	Left/Right	Left/Right	Left/Right	Left/Right	Left/Right	Left/Right	Left/Right
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-/1	-	-	-	1?	1/1	1/-
-	-	1	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	1?	-	-
-	-	-	-	-	-	-	1	-
-	-	-	-	-	-	-	1	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	1/1	2/2	-	-	-	1/-	-/1
-	-	-/2	2/2	-	-	-	2/2	1/1
-	-	-	2/2	-	-	-	2/-	1/-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
2/-	2/2	-	1/-	2/2	2/2	-	-/2	1/1
-	-	-	-	-	-	-	-	-
-	-	1/-	2/2	2/2	2/2	-	-/2	1/1
-	-	-	-	2/2	-	-	2/-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-

Table 7.7 continued

Bundle #30	*Bundle #30*	*Bundle #34*	*Bundle #34*	*Bunde #37*	*Bunde #40*	*Bunde #40*	*Bunde #42*	*Bunde #42*
SK 18	*SK 19*	*SK 20*	*SK 21*	*SK 22*	*SK 23*	*SK 24*	*SK 25*	*SK 26*
Adult/M	*Adult/F?*	*Y.Adult/?*	*Adult/?*	*20-30/M*	*Y.Adult/F*	*Adult/?*	*Adult/F*	*3-6/?*
Left/Right	Left/Right	Left/Right	Left/Right	Left/Right	Left/Right	Left/Right	Left/Right	Left/Right
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	1/1	-	-	-	-	-	-	-
-	-	-/2	2/1	-	-	-	-	-
-	-	-	-	-	-	-	1	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	-	-	2/1	-/1	1/2	-	2/-	-
-/1	-	-	2/-	-	-	-	-	-
1/1	-	-	-/2	-	1/-	-	2/-	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
2/2	-	-/1	-	-	-/2	-/2	-	2/-
-	-	-	-	-	-	-	-	-
1/2	-	1/-	1/-	1/-	-	-	-/1	-
-	-	-	-	-	-	-	-	-
-	-	-	-	-/1	-	-	-/1	-
1	-	-	2	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	4	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-
-	4	-	-	-	-	-	-	-

Table 7.7 continued

Bundle Number	SK #	Element	Pathology	Trauma	Post-Mortem Processing
Bundle # 1	-	L Femur	-	-	5 CM <1 cm in length proximal anterior surface below greater trochanter
	-	R Femur	osteomyelitis	-	-
Bundle # 2	-	R Ulna	-	-	#? CM <1 cm in length on posterior surface of olecranon fossa
	-	R Femur	-	-	#? CM on proximal diaphysis
	SK 3	R Femur	-	-	7 CM <1 cm in length across the greater and lesser trochanters
	-	L Femur	-	-	#? CM on proximal diaphysis, femoral neck
Bundle # 6/7	-	R Femur	-	-	#? CM on proximal end
	-	R Femur	-	-	#? CM priximl diaphysis
	-	L Femur	-	-	#? CM posterior surface across lesser trochanter
	-	R Ulna	-	-	#? CM on proximal and distal shaft
	-	L Ulna	-	-	#? CM on proximal and distal shaft
	-	R Radius	-	-	#? CM on proximal and distal shaft
	-	L Radius	-	-	#? CM on proximal and distal shaft
	SK 6	R Femur	-	-	#? CM <1.5 cm in length on the proximal posterior surfae near greater and lesser trochanters
Bundle # 12	SK 8	R Ulna	-	-	5 CM 1 cm in length on the proximal medial surface
	SK 8	L Femur	-	-	4 CM 1 cm in length across the posterior surfacae of femoral neck
Bundle # 17	-	L Tibia	active periostitis	-	-
Bundle # 21	SK 12	L Tibia	active periostitis	-	-
Bundle # 24	SK 13	R Femur	-	-	15 CM 0.5-1 cm in length posterior sruface of femoral neck
Bundle # 27	-	L Humerus	-	-	7 CM >1 cm in length medial epicondyle
	-	R Radius	-	-	3 CM >1 cm in length radial tuberosity
	-	L Tibia	osteoarthritic lipping on proximal/distal articular facets	-	-
Bundle # 30	SK 18	L Tibia	-	-	7 CM <1 cm in length near soleal/popiteal line
Bundle # 31	-	L Femora	osteoarthritic lipping on distal medial and lateral epicondyles	-	-
	-	R Tibia	healed periostitis on lateral proximal surface	-	-
Bundle # 32	-	Lumbar V. #2,3,5	osteoarthritic lipping on vertebral bodies	-	-
	-	Cervical V. #1	osteoarthritic lipping on vertebral body	-	-
	-	R Tibia	healed periostitis on anterior shaft	-	-
	-	L Tibia	healed periostitis on anterior shaft	-	-
Bundle # 33	-	R Tibia	healed periostitis on anterior shaft	-	-

Table 7.8 Pathology, Trauma, Post-mortem Processing of Adults, Burial Complex #3

	-	R Tibia	bony growth on tubercle	-	-
	-	Skull 1	pin-point porosity on right parietal, supra-orbital ridge	-	-
	-	Skull 3	pin-point porosity L/R parietals, occipital, supra-orbital ridges	3 oval fractures (blunt force trauma) on the posterior left parietal near saggital suture	-
	-	Mandible 1	-	-	#? CM present on left side of mandible above mental foramen
Bundle # 34	SK 20	R Femur	-	-	#? CM present on proximal, lateral and posterior sruface of femoral neck near head and greater trochanter
	SK 21	R Calcaneus	osteoarthritic lipping on articular surface	-	-
	SK 21	R Talus	osteoarthritic lipping articular surface	-	-
Bundle # 43	-	L Femur	osteoarthritic lipping on facet of distal medial epicondyle	-	-

. #? Number Unknown

Table 7.8 continued

Bundle Number	SK #	Element	Head Diameter	Length*
Bundle # 2	SK 3	L Femur	4.2	-
	SK 3	R Femur	4.1	
Bundle # 3	SK 4	R Humerus	4.4	32.5
	SK 4	R Femur	4.9	45.6
	SK 4	L Tibia	-	39
Bundle # 5	-	R Femur	-	52.2
Bundle # 6/7	SK 6	R Femur	4.8	-
Bundle # 8	SK 7	R Femur	-	41
Bundle # 12	SK 8	L Femur	5.1	-
Bundle # 16	-	-	-	-
Bundle # 17	-	L Tibia	-	36.4
	SK 9	R Femur	4.2	42.5
	SK 10	R Femur	4.5	-
Bundle # 18	SK 11	R Humerus	4.1	-
	SK 11	L Humerus	4.2	31.4
	SK 11	L Tibia	-	37.5
Bundle # 21	SK 12	L Femur	4.5	42.6
Bundle # 22	-	L Femur	4.1	45.8
	-	R Tibia	-	36.1
	-	L Tibia	-	36.8
Bundle # 24	SK 13	R Femur	4.9	-
	SK 13	L Femur	-	43
	SK 13	L Tibia	-	36.6
	SK 14	L Femur	-	43.6
Bundle # 25	SK 16	R Humerus	3.5	31.7
	SK 16	R Femur	-	43.2
	SK 16	R Tibia	-	36
Bundle # 27	-	L Tibia	-	38.8
Bundle # 29	SK 17	R Femur	4.2	44.5
	-	L Femur	4.3	44.5
	-	R Tibia	-	36
	-	L Tibia	-	36
Bundle # 30	SK 18	L Tibia	-	39.9
Bundle # 31	-	L Femur	-	45.9
	-	R Tibia	-	39.4
Bundle # 32	-	L Humerus	4.5	30.1
	-	L Humerus	3.9	-
	-	R Femur	4.2	44.4
	-	R Femur	-	39
	-	L Femur	4.5	41
	-	L Femur	4.2	45.5
	-	L Femur	4.6	45.8
	-	L Femur	5	45.7
	-	R Tibia	-	38
	-	R Tibia	-	35.2

Table 7.9 Element Measurements of Adults, Burial Complex #3

	-	L Tibia	-	35.5
	-	L Tibia	-	40.5
	-	L Tibia	-	38.2
	-	L Tibia	-	35.8
	-	L Tibia	-	37.2
Bundle # 33	-	R Femur	4.9	46
	-	R Femur	3.8	43.9
	-	R Femur	4.7	-
	-	R Femur	3.9	42.1
	-	R Femur	3.9	41.2
	-	R Femur	-	45.4
	-	L Femur	4.7	45.9
	-	L Femur	3.8	40.6
	-	L Femur	3.7	40
	-	R Tibia	-	34
	-	R Tibia	-	35.3
	-	R Tibia	-	38
	-	R Tibia	-	36.9
	-	L Tibia	-	33.5
	-	L Tibia	-	38
	-	R Humerus	5.1	33.4
	-	R Humerus	3.6	-
	-	R Humerus	3.8	29.7
	-	R Humerus	4.6	32.3
	-	R Humerus	4.1	29.2
	-	L Humerus	4.6	32.3
	-	L Humerus	3.9	30.7
Bundle # 34	SK 20	R Femur	4.5	45.4
	SK 20	L Tibia	-	37.1
	SK 21	L Tibia	-	34.7
Bundle # 37	SK 22	R Humerus	4.6	33.9
	SK 22	L Tibia	-	39.4
Bundle # 40	SK 23	L Humerus	4.1	29.7
	SK 23	R Femur	-	42
	SK 24	R Femur	-	44.7
Bundle # 42	SK 25	L Humerus	3.9	-
	SK 25	R Tibia	-	37.7
	SK 26	L Femur	-	16.5
Bundle # 43	-	L Femur	4	43.7
	-	R Femur	4.1	44.2
	-	R Humerus	4.7	34.5
	-	L Humerus	3.7	30.9
	-	L Tibia	-	37.2
	-	R Tibia	-	34.6

**Length measurmentes taken using osteometric board from proximal epiphysis to distal epiphysis*
'-' ubobservable
measurements in CM

Table 7.9 continued

CHAPTER 8

SUMMARY AND CONCLUSIONS: Towards an Indigenous Archaeology of Religion

"To read the land…is to attend to the multiple clues that reveal the activities and intentions of its manifold human and more-than-human inhabitants."

-Timothy Ingold, 2013

The title of this chapter directs the reader toward a new way of thinking about religion, specifically toward an indigenous ontological perspective. As I use the word 'Indigenous' I am aware of its more appropriate reference to the many international native communities with specific rights and ties to lands and territories, but I am also thinking of the word in terms of the definition 'originating or occurring naturally in a place' (Oxford Dictionary 2010). An indigenous archaeology of religion considers the relationships among the historically contingent practices of persons (both human and otherwise) and a particular place. Religion, then, is accessible in archaeologically recoverable materials, actions, households, monuments, movements, and in both the built and natural landscapes. An indigenous archaeology of religion considers the multiple complexities that constitute belief and being in a particular place at a particular moment; it is historical. Following Aldenderfer (2010: 77), an indigenous archaeology of religion is concerned not with what religion is but rather with what it *does*.

The previous seven chapters present multiple lines of evidence to address the relationships between such an indigenous religion and the emergence of the city of Cahokia ca. AD 1050. Prior to this study, archaeologists often sought explanations for Cahokia's emergence that were bound by economic, political, or evolutionary models (see Brown et al. 1990; Byers 2006; Emerson 1997; Fowler 1997; Kelly 1990; see also Alt 2010; Cobb 2003; Pauketat 2002 for a review). Such models looked for markers of complexity like elite burials, elite or special-use buildings, and often explained platform mounds as stages for elite houses and restricted ritual practices (see Milner 1998). These perspectives sought to partition the archaeological record into identifying commoners here and elites there, arbitrarily segregating space and supporting a hierarchically based chiefdom model of Cahokia's emergence (see Anderson 1994; see also Chapter 3). Cahokia was often couched in theories of complexity that presented an evolutionary model of its emergence (see Chapter 3 for a review). Such models were concerned with the environment and resources (economic and otherwise) as structuring Cahokia's emergence; people, with agency, were reluctantly incorporated into such models as aggrandizing elite (male) rulers, immigrants or commoners, and craft specialists or ritual leaders (see Anderson 1994; Kelly 1990; see also Peregrine 1992).

Such studies and theories portrayed Cahokia and its people as static; there was little room for agency let alone agency for other-than-human persons, the land, or movements. As Alt states (2010a: 4), "there are multiple ways to be complex, and we know that archaeology can do much better than look for simple markers thought to stand for larger processes." This perspective opens the door, so to speak, for relational theories of complexity that consider the interdigitation of multiple things, or doings, and histories (see Chapman 2003; Fowles 2013; Sassaman 2004). This interdigitation has recently been discussed in terms of bundles, or bundling, where all manner of life has the potential to participate in relationships that constitute practices, places, and histories (see Pauketat 2013a; see also Ingold 2014; Zedeño 2008).

So then, what does this relational perspective have to do with ridge-tops, burials, earth, and causeways? Throughout this dissertation I have addressed the modification of the natural landscape for the construction of Cahokia, the construction of unique mortuary mounds, the construction of the Rattlesnake Causeway, and the methods of burial of multiple persons in ridge-top mortuary mounds. All of this evidence identifies complexities of practices on both the micro (episodes of mound construction, the processing of human remains) and macro scales (the orientation and layout of Cahokia, the building of the Rattlesnake Causeway). These complexities, I argue, constitute the ‘doings’ or practices that embody an ontology that can be described/discussed within the context of religion (see Deloria 2003; see also Fowles 2013); it is this religion and the practicing of it that was intimately entwined with Cahokia’s beginnings. These ‘doings’ include, but are not limited to, the making of marine shell beads and the subsequent deposit of those beads with the dead, the laying down of specially colored soils in the process of mound construction, the selection of locations on the landscape that cite celestial movements orienting earthen constructions and Cahokia to the moon, the burial of the many disarticulated and articulated dead, the modification of the natural landscape as well as the recognition that this landscape has a deep history of occupation. As stated in Chapter 3, it does not particularly matter what these practices are actually called, but rather that it is understood that such practices constitute a way of relating to the world and to history that is relational and generative of change.

Using the word ‘religion’ or the phrase ‘New Animism’ here references the anecdote presented at the beginning of Chapter 3, the one that explored the relationships and movements shared among persons, both human and otherwise. There is a flexibility to this New Animism that previous archaeological perspectives on complexity and religion could not access (see Fogelin 2007, for example). This flexibility takes into account the *potential* for agency in anything; it recognizes that places, people, and things are comprised of entanglements that are rooted to history, memories, and the present context (see Ingold 2010). Processes and relationships are not as abstract as one might image, but rather they are accessible through an historical perspective that examines how, for example, the construction of a ridge-top mound was part of a complex series of events that helped build an ancient city. Such an analytical perspective is, at its core, a relational perspective. This brings me back to the idea of an indigenous archaeology of religion that 'considers the multiple complexities that constitute belief and being in a particular place at a particular moment.'

Through a rigorous landscape analysis of the city of Cahokia, with particular focus on it's alignments to the cosmos, the manipulation of the natural and built landscape, the orientation and location of ridge-top mortuary mounds and the ways Native Cahokians buried their dead, I argue that Cahokia's emergence was inherently entangled with the practices of a new religion. These practices constitute the processes of Cahokia's emergence as a city; they help identify *how* Cahokia was constructed. As previously stated in Chapters 1 and 3, the 'new' component of this religion was in the execution and the practice, which "can explain in different ways the formation of political regimes, urban developments, and orthodox religions worldwide" (Pauketat 2013a: 187). Through focusing on the construction of ridge-top mounds and the burial of the dead in those places, I presented data on what people through the practicing of religion can do: build the landscape, mediate relationships with the dead and the ancestors, and presence the cosmos on earth through the orientation and location of the Rattlesnake Causeway and ridge-top mounds. In this context, such a new Cahokian religion and associated ridge-top mound activities had the potential to be generative of cultural change, meaning Cahokia was in part created *through* the practice and execution of ridge-top mortuary events. Further, such practices were indigenous to the land, transforming and re-structuring the natural topography to create something uniquely Cahokian and inherently complex. Additionally, these practices (the burial of multiple persons in a mound as well as aligning space to specific cosmological orientations) had historical ties to the Hopewell and even the Archaic period emphasizing the relationality of such mortuary practices through time; these practices are identifiable in the construction of Hopewell and Archaic period mounds and the orientations of earthen mounds to the sites. The remainder of this chapter serves to synthesize the previously presented data and contextualize it within a theoretical perspective primarily concerned with relationships and how such relationships created Cahokia.

A NEW RELIGION

The city of Cahokia consists of three precincts (Downtown Cahokia, East St. Louis and St. Louis) that bridge the Mississippi River from present-day southern Illinois to St. Louis, Missouri. All three precincts consist of a mound and plaza organization with neighborhoods, public spaces, water-filled borrows pits, circular and rectangular platform mounds, and ridge-tops (see Fowler 1997; Kelly 1994, 1996; Pauketat 2013a, 2013b, Milner 1998). Downtown Cahokia was constructed first ca. AD 1050 and described as a “Big Bang”, which dramatically restructured local Late Woodland lifeways (see Pauketat 1994, 2002; see also Chapter 2). The construction of Downtown Cahokia was followed in quick succession by the construction of East St. Louis and St. Louis- two smaller precincts that likely served as civic-ceremonial spaces expanding the Cahokian vision out across the American Bottom floodplain and the Mississippi River (see Pauketat et al. 2013). Importantly, the inhabitants of these three precincts shared knowledge of how to build and maintain the broader Cahokian community; this is evidenced in similar site organization/layout and construction of mounds, plazas, and neighborhoods. Where others (see for example Anderson 1994; Milner 1998; Peregrine 1992) have argued that these three precincts constitute a hierarchically ranked complex chiefdom, or a three-tiered settlement hierarchy (see Chapter 3), I choose to focus on the relationships among these three precincts to “the restructuring of social, political, and religious life across the region”, and in particular as they were tied to the introduction of ridge-top mortuary practices and the reconfiguration of the American Bottom landscape (Pauketat et al. 2013). Focusing on Downtown Cahokia, the Rattlesnake Causeway and the ridge-top mounds of Mound 72, Mound 49, Powell Mound, Rattlesnake Mound, and Wilson Mound I address the histories of these earthen constructions in relation to Cahokia's beginnings.

Downtown Cahokia ca. AD 1050 consisted of a central mound, plaza and causeway core with two ridge-tops in association with the 752 m long Rattlesnake Causeway. Specifically, Mound 72 is a short six minute walk to the west from the Rattlesnake Causeway and Rattlesnake Mound is located on the southern end this feature. If you extrapolate and extend the sight line of the causeway further north past the Twin Mounds, the sight line of the causeway passes to the east of Mound 49, another small ridge-top located in the Grand Plaza. Cahokian builders repurposed the natural topography of the floodplain creating mounds and neighborhoods out of the low ridge and swale topography. Some might argue that to build a city in the midst of a floodplain would be counterintuitive; however, Cahokian builders were conscious of the landscape, intentionally modifying the topography to account for the accumulation and drainage of floodwaters, for example (see Dalan et al. 2003; see also Alt et al. 2010; see Chapter 2). In addition to this modification, there were benefits to residing in a floodplain, not the least of which was the fertility of the land. Such fertility and emphasis on agriculture is exemplified in the Earth Mother flint clay figurines that combined the feminine, crops, ancestors, and marine shell in their imagery (Emerson 1989; Emerson et al. 2002; see also Pauketat 2013a). Others have argued that the presence of flood and rainwaters when coupled with this fertility imagery were metaphorically important, embodying the earth diver myth and the creation of the natural world (see Hall 1997; Lankford 2007).

Further, the construction of earthen mortuary mounds in these low lying areas used alternating layers of light and dark clays and sands, which "balanced the daytime sky into which they [mounds] rise with the darkness of the night and the earth beneath" (Pauketat 2013a: 165). The inclusion of dark gumbo clays has been suggested as not only important to the structural integrity of these mounds, but also as a material citation of the watery underworld (see Hall 1997). Clay gumbo soils were dug up from the marshy, wet areas of Cahokia and utilized in the construction of ridge-top mounds. In addition, Rattlesnake Mound was intentionally built in a low swale where Cahokian's likely artificially raised the area of earth directly underneath the mound, extending the natural ridge to the west (see Chapter 5). Knight (1989) describes such mounds as portals or 'navels' facilitating the "convergence of realms" (Pauketat 2013a: 165). Mounds, and in particular ridge-tops, then interdigitated with the earth, the sky, the cosmos, and the dead served not only the functional purpose of covering dead bodies, but also were places characterized by a complexity of relationships and citations to the past, the present and the future (see Echo-Hawk Jr. 2009).

The origins of Cahokia and the practices of a new religion, I hypothesize, are embedded in the construction of the Rattlesnake Mound complex, which includes the Rattlesnake Causeway, Mound 66 and the marshy ridge and swale topography it is constructed upon, at least 6 additional small conical mounds, Mound 64, and the small, elongated platform flanking the northern face of Mound 66 (see Figure 5.2). This series of mounds, for the most part, are still intact today and have yet to be archaeologically excavated (with the exception of Mound 66) save a survey conducted by Moorehead and Taylor during their Rattlesnake excavation in the 1920s. The chronological affiliation of this mound and causeway complex date to an estimated early Lohmann phase; additionally this area was consistently re-visited through the late Stirling phase as evidenced by the later construction and decommissioning of a large Stirling phase building (feature 1) along the southern face of the mound (see Chapter 5). Additionally, pottery recovered from the Taylor excavations and his survey of the surrounding mounds indicates that people continuously traveled back to the Rattlesnake complex, likely along the causeway. Pottery rims from the Lohmann to Moorehead phases were present in artifact assemblages recovered from the area immediately south of feature 1 (Rattlesnake Mound), as well as on the two conical mounds (82 and 83) flanking the western end of Rattlesnake Mound. The early, pervasive, and continued use of this area suggests that the Cahokian landscape was likely constructed in relation to the Rattlesnake complex, which was arranged around the Rattlesnake Causeway, an important and central feature to Cahokia's overall site organization.

The reason why I hypothesize that Cahokia was constructed in relation to the Rattlesnake complex is because the Rattlesnake Causeway was one of the earliest Cahokian constructions, and likely built to set up the precinct's 5^{o} offset grid that aligned the Lohmann (AD 1050-1150) phase Cahokian landscape (see Collins 1997; Dalan et al. 2003). The 5^{o} offset grid oriented the Grand Plaza, neighborhoods, Monks Mound, Murdock Mound, and importantly Rattlesnake Mound, Mound 49, Mound 51, and also Powell Mound (Reed 1969; Smith 1969; see also Fowler 1997; Chapter 2; see also Pauketat 2013a: Figure 6.5). The construction of the Rattlesnake Causeway was an important if not critical component to Cahokia's emergence, one that until now was thought lost to the construction of a modern railroad berm (see Chapter 5; see also Baires 2014; Pauketat 2013a). The estimated labor required to build the causeway (9,516 person-days) is similar to the amount of labor required to construct a portion of the Grand Plaza (10,560 person-days [Alt et al. 2010]), not to mention what would have been required to build the multiple pre-fabricated walls used in numerous rectangular wall-trench buildings identified at Tracts 15 A and B, ICT II, and the other mounds, plazas, and borrow pits that constituted the early Cahokian landscape (see Tables 5.1, 5.2, Chapter 5) (see Alt and Pauketat 2011; Collins 1997; Dalan et al. 2003; Fowler 1997; Pauketat 1994, 1998). The Rattlesnake Causeway, which begins at Rattlesnake Mound, I hypothesize was the central feature of Cahokia, one intimately entangled with movements of earth, persons, bones, and items like shell beads and pottery.

The early chronological affiliation and orientation of the causeway is supported by Romain's hypothesis, which postulates that the alignment of this feature is a flipped mirror image orientated to a lunar standstill visible (every 18.6 years) over the bluff line to the southeast of Downtown Cahokia (*in press*; see Chapter 5; see also Baires 2014; Pauketat et al. 2014). Importantly, this hypothesis cites the relationship between Rattlesnake Mound and the causeway specifically, arguing that the causeway was intentionally oriented to a diagonal line drawn through a five degree offset square (comprising the Grand Plaza) which is aligned to this lunar standstill. This hypothesis, which also indicates that Cahokian's were skilled enough astronomical observers to build a city in alignment with this lunar standstill (see also Pauketat 2013a), suggests that Rattlesnake Mound, as the genesis of the causeway, was an early Cahokian construction orienting Cahokia's site lines and landscape to the cosmos and to the dead.

Although radiocarbon dates from both of the causeway and Rattlesnake Mound could be improved upon, one radiocarbon assay from the southern end of the causeway dates the construction of this monument to the early Lohmann to Stirling phases (see Chapter 5). Further investigation of the causeway needs to be completed to accumulate more reliable dates, the combined contextual evidence, including the five-degree offset orientation, which aligns the other Lohmann phase mounds, plazas, and neighborhoods in Downtown Cahokia and most importantly the Grand Plaza, Monks Mound, and Rattlesnake Mound, supports, the hypothesis that the Rattlesnake Causeway was an early construction. Why? Because the causeway set up Cahokia's Lohmann phase organizational grid. This supports my hypothesis that Cahokia began with the construction of the Rattlesnake complex, and was quickly (if not contemporaneously) followed by the construction of the Grand Plaza and Monks Mound, as well as the ridge-tops Mound 72, Wilson Mound, and Mound 49 (see Alt et al. 2010; Dalan et al. 2003 for dates of construction). These construction events when viewed on the macro-scale should be viewed as a complexity of 'doings' entangled with and generative of Cahokia's emergence (see Fowles 2013; see also Ingold 2010). To recall Alt (2010: 4), "there are multiple ways to be complex" and the intentional reorganization of the natural topography, the 'bundling' together of earth, buildings, and persons, and the re-orientation of local Late Woodland ways of life constitute part of this complexity.

As part of this Rattlesnake complex, the construction and use of the Rattlesnake Causeway was intimately tied to how Cahokians envisioned their world, which included bundling together the realms of the living and the dead through the use of things like unique Ramey style pottery vessels, the colored layering of mound construction fills, and the movement and burial of the dead in ridge-top mounds (see Baires 2014; see also Pauketat and Emerson 1991). For some contemporary Native American persons it is difficult and unnecessary to spiritually separate the living world from the world of the ancestors, which provides context for the hypothesis that ridge-top mounds were integrated pieces of the overall Cahokian landscape, which included the spiritual and lived-in realms. These places and the practices that occurred at each mound ensured proper burial and treatment of the dead, potentially aiding the spirit to the successful completion of its journey to the afterlife (see Echo-Hawk 1992; Riding In et al. 2004).

Cahokians constructed the causeway in a central location, which organized Rattlesnake Mound to the central part of Downtown Cahokia. There is a likelihood that the causeway constituted a physical embodiment of something like the Path of Souls, leading the dead on their journey through the watery underworld (reflected in the marshy ridge and swale topography) south to the spirit realm embodied in/by Rattlesnake Mound (see Chapter 5). Elsewhere I (Baires 2014: 13) have posited,

> the Rattlesnake Causeway was an earthly manifestation of such a celestial causeway where the living constructed a space to facilitate the movement of the deceased (both

> body and soul) to their final resting place…emphasi[zing] the multidimensionality of activity and experience.

The practices, or the carrying of disarticulated bodies, the movement of the living, and the gathering together of soils, shell beads, and earth, that potentially occurred along this causeway constitute movements that entangled the person traveling along this feature with the earth under his/her feet, the sky above, the materials they carried, and the reasons for their journey. The Rattlesnake Causeway was a way to access mortuary spaces, which were also active places that contained many persons, both human and otherwise, embarking on journeys of their own. This earthen feature was the nexus of both the built and natural landscapes where natural soils were utilized in constructing a raised causeway feature. Zedeño and Bowser (2009: 5) argue that these spaces and the "naming and the construction of natural metaphors and imaginaries promote the preservation and transmission of knowledge by reference to singular places." More simply, the multiple movements (e.g. piling of earthen construction fills, walking along the causeway) bundled together to construct the causeway facilitated both the creation and transmission of knowledge(s) that incorporated multiple realms of experience. This knowledge, I would argue, was likely religious and indigenous in nature and entangled Cahokia's beginnings with the dead, the environment, and movements. The Rattlesnake Causeway, as much as it facilitated movement, was also importantly a process itself; as Joyce et al. (2009: 53) state, "[p]laces are not merely the evidence that something happened; they are the thing itself in the process of happening."

When thinking through the processes that constitute the Rattlesnake Causeway, one must also consider the relationship between the causeway and the ridge-top mounds constructed along its path as well as those oriented and aligned to the Cahokia grid (see Chapter 2). Constructed to the west of the cauaseway, the Mound 72 complex includes a small platform mound, the small ridge-top, and at least two large upright posts. As previously discussed, this complex was also built in a marshy swale (like the Rattlesnake complex) with evidence for the intentional alteration of the natural topography by filling in low-lying ground, and constructing foundational buildings and pits prior to the addition of the platform and ridge-top mounds themselves (see Watson 2005). Mound 72 consists of a series of sequential and contemporaneous events that characterize ridge-top mound practices, which include the construction of small buildings, pits, post pits, burials, and mound stages. Mound 72 construction dates to the beginning of the Lohmann phase and was likely contemporaneous with the construction of the causeway, the Rattlesnake complex, and the construction of Downtown Cahokia (see Fowler et al. 1999; see also Demel and Hall 1998).

Although Mound 72 has often been discussed as an isolated, foundational and uniquely performed mortuary event (see Fowler et al. 1999; see also Brown 2010; Goldstein 2000; Porubcan 2000), I would argue that the incorporation of this mound within a context that considers the roughly contemporaneous ridge-tops of Rattlesnake Mound, Wilson Mound, Mound 49, and even the later Powell Mound provides a more nuanced view within which to parse the relationships among these places. When considering all of these monuments together, the picture of Cahokian mortuary practice changes, highlighting the relationality shared amongst Cahokia's ridge-tops, rather than focusing on these mounds as isolated and singular events.

If the Rattlesnake Mound complex was constructed early and possibly first, orienting Cahokia along the five degree offset and the realm of the dead, then Mound 72, Mound 49, and Wilson Mound followed in quick succession presencing the dead in similar ways throughout the Cahokian landscape (see Chapter 4). When the sequence of mortuary events began at Cahokia (ca. AD 1050), this included the construction of features, post pits, and the burial of multiple individuals at Mound 72 and at Wilson Mound (ca. AD 1050), as well as the construction of

Mound 49. As discussed in Chapters 4, 5, and 6, Rattlesnake Mound, Wilson Mound, Mound 72 and Mound 49 all have construction sequences that date to the early Lohmann phase and Cahokia's emergence indicating that these ridge-tops were important to the vision of what Cahokia was to become. Rattlesnake Mound, Mound 72, and Mound 49 all, importantly, cite the Rattlesnake Causeway and were either situated on its southern end (Rattlesnake Mound) or constructed to the west of the causeway itself (Mound 72). Even though Mound 72 and Mound 49 were not constructed directly on top of the causeway, they were still relationally tied to that feature in both location and function. If my hypothesis regarding the causeway as something like the Pathway of Souls is correct, then the causeway likely served as a point of access to these mounds. One can imagine a group of people walking along this feature to access Mound 72 and Rattlesnake Mound bringing with them their bundled dead and associated materials.

In the contexts of Mound 72 and Wilson Mound, these early construction phases included the burial of multiple individuals in comingled contexts as well as the construction, use, and dismantling of small anachronistic buildings. These buildings employed post-hole construction techniques and small, abnormal sizes and shapes that diverged from the standard Lohmann phase Cahokian house style (see Pauketat and Alt 2005). After a short use-life (evidenced by a single construction episode and no rebuilding) both of these small structures were then decommissioned (through fire at Wilson Mound, and through dismantling at Mound 72), covered over with a thin layer of earth and in the context of Mound 72, with bundled human remains. At Wilson Mound, this small feature (no. 25) set the stage, so to speak, for the remaining episodes of mound construction and burial of human remains to follow.

Following the dismantling of their respective foundational buildings, both of these mounds went through a series of construction episodes and burial events that included the interment of multiple disarticulated individuals buried in bundles, extended primary burials, and the inclusion of sacrificial individuals in pit features. Both mounds also included a series of cached sumptuary items, which at Mound 72 consisted of an array of objects that included non-local mica, copper, chert and marine shell (see Fowler et al. 1999). The Wilson Mound assemblage consisted mainly of marine shell beads and conch shells procured from the Gulf Coast of present day Florida, copper covered/stained ear spools, a bear tooth pendant, and non-local pottery wares (see Chapter 6).

The similarities in mortuary process evidenced at these two early ridge-tops indicate a shared method of mound construction and burying of the dead. Although there are slight differences in the amount of individuals buried as well as the style of burial (one pit vs. multiple pits) the overarching knowledge of *how* to bury the dead was embedded in a historical process. The events and practices that took place at each mound consisted of a complexity of practices, materials, and persons with a relational quality. The burial of 190 persons in Wilson Mound likely could not have taken place without the preceding mound construction events or the termination through fire of feature 12, and the subsequent lining of the mortuary feature with a clean sandy fill. What I mean is that these events came together and resulted in a very specific mortuary experience and feature (B.C. #3), which without the previous construction stages and foundational features, pits, and burials would likely have been envisioned differently. The sequence of events at these mounds was important! At Mound 72, Cahokian participants had an historical knowledge of past burials and events that occurred there; this is evidenced in the re-excavation of certain features which stopped right before they hit previously buried remains. New bodies and bundles of items were then interred in those re-excavated areas as if in citation to a shared past, or as a way to remember and revisit a particular history (see Van Dyke and Alcock eds. 2003; see also Mills and Walker eds. 2008).

Wilson Mound and Mound 72 were approximately 4 km away from one another as the crow flies; this distance would make it difficult to directly observe the events at both of these mounds simultaneously, but it is very likely that the participants at both ridge-tops were aware of the other, as well as the events and practices taking place. Again, these mounds were contemporaneous constructions, and the mortuary events at both mounds spanned the middle/late Lohmann to early Stirling phases, roughly 50 years, or between one and two Cahokian generations (see Chapter 4, 5, and 6) (see Ubelaker 1992 and Steckel et al. 2002 for discussion of life expectancy ranges in the Americas). Evidence of Cahokian's actively remembering their past through re-excavation of pit features, abandoned houses, ridge-top and platform mounds supports the conclusion that the participants in these mortuary activities had access to an historical knowledge embedded in and retrievable through the built landscape (see Pauketat 2013a; see also Fowler et al. 1999). This historical memory was then translated across mortuaries through the bundled practices of mound construction and burial of multiple persons.

In conjunction with Wilson Mound and Mound 72, construction also began on Mound 49 during the early Lohmann phase. The chronological affiliation is predominantly based on the stratigraphic relationship of Mound 49 to the construction of the Grand Plaza, "represented by… a series of thin, blanket mantles…atop an intact soil horizon…[a]t the same time or shortly after the earliest mound-stage constructions, the soil horizon north…was dug away and refilled with the fill of the new Grand Plaza" (see Pauketat et al. 2010: 434). Mound 49 also has evidence for specially prepared platforms (or stages) of earth with buildings constructed on top. These buildings were decommissioned and covered over with subsequent layers of colored soils. Although no evidence for the interment of human remains was identified at Mound 49, this small ridge-top seems to bundle together prepared soils with buildings and pit features. Additionally Mound 49 was constructed in the Grand Plaza, potentially as part of a relationship of mounds and features that served to presence the dead in another way. This, of course, is speculative but the fact remains that Mound 49 featured a series of mound and building construction episodes that combined the earth with special-use buildings and red ochre that may have cited the practices and events taking place at the contemporaneous ridge-tops of Mound 72 and Rattlesnake Mound, for example (see Pauketat et al. 2010).

Similarly, Powell Mound (located on Cahokia's western 'boundary') construction spanned the late Lohmann to Stirling phases (AD 1100-1200) with a pre-mound occupation dating to the early Lohmann phase. Although slightly later than the beginnings of Wilson Mound, Mound 72, Mound 49, and Rattlesnake Mound, the construction and mortuary events documented at Powell Mound overlapped with its earlier ridge-top counterparts, specifically with Wilson Mound. Like Wilson Mound, Powell Mound consisted of two burial pits containing at least 150 individuals buried in bundles layered with marine shell beads and thin lenses of soils. These pit features were dug into decommissioned buildings, like Wilson Mound, identifying another instance where Cahokian's combined the deceased with abandoned structures. Both Powell Mound pit features likely date to the Stirling phase and overlap with the dates for B.C.#3, Wilson Mound. The same series of features is also noted at Cemetery Mound, the Big Mound, and Mitchell Mound where mortuary features contained bundled and extended interments buried with items like shell beads, copper materials, turtle rattles and pottery (see Chapter 4). The East St. Louis, St. Louis, and Mitchell ridge-top mounds were additional large, Stirling/Moorehead phase mortuaries oriented along a similar axis (east to west) as Rattlesnake Mound and Powell Mound. Although all three mounds were destroyed and minimally documented, details from each mound confirm the hypothesis that ridge-tops were constructed in a series of similar ways that include intricate layers of soils, primary mound surfaces, buildings, and human remains. This construction sequence, when conceptualized as a relational bundle, "reveals that ancient American religion was practiced not professed…[and] rooted in the everyday experience of order, in how people positioned and aligned themselves with respect to cosmic forces" (Pauketat 2013a: 190).

If, following Pauketat, Native American religion is "practiced not professed" then this religion should be accessible through the archaeological record. I argue, sequences of buildings, earth, and bodies are one such way to access the practices of religions. Rattlesnake Mound importantly also features a building (feature 1) added to the southern face of the mound after the completed mound construction. This structure was decommissioned and covered over with a series of bundled human remains and materials and oriented to approximately 120^{o} of azimuth, potentially re-aligning Rattlesnake Mound and complex to a later Cahokian site orientation identified during the Stirling phase (AD 1100-1200) (see Chapter 5). This bundle of mound, building, and bodies as it re-oriented the Rattlesnake complex potentially effected the later years of Cahokia's existence as a community, re-organizing neighborhoods and households to a new way of being. Again, Pauketat (2013a: 190) states "[t]hey are lived relationships…and they change history."

Minimally, I argue that this evidence of multiple burials of individuals occurred at two (Mound 72, Wilson Mound) if not four (Powell Mound, Rattlesnake Mound) ridge-top mound locations within a span of 50-100 years, between two and three Cahokian generations. Buildings and ridge-top mounds are an important set of relationships that uniquely incorporate the bundling of earth with items like pottery, shell beads and human remains. Although the processes of bundling may diverge slightly (i.e. how many individuals are buried in one context, the nature of the mortuary feature, and the way buildings were dismantled), these practices cite an historical knowledge of *how* to bury the dead. As stated previously, these shared practices likely embodied a new religion; one rooted in a history of mound building that was re-envisioned at Cahokia in a way that entangled celestial alignments, bodies, persons, and the earth. Cahokia was larger than anything that had come before; ridge-top mounds were new types of mounds not previously built or used by Native North Americans, and mass graves of persons interred with unique pottery, marine shell beads, foreign items, and other materials like copper and mica were large-scale events at Cahokia, without precedence (see Hopewell for comparison Carr and Case eds. 2006).

In summation, ridge-top mound construction and use in the Cahokia precinct began during the early Lohmann phase (AD 1050) with Wilson Mound, Mound 72, Rattlesnake Mound and Mound 49. Powell Mound construction began ca. 50 years later at AD 1100. These earthen mortuary mounds were built in Cahokia's center (along the orientation set up by the Rattlesnake Causeway and in the Grand Plaza) and along its southern, western, and southwestern precinct boundaries. Each mound was constructed in at least two sequential stages and included at least one burial feature (with the exception of Mound 49). Each mortuary feature typically included multiple individuals in either a primary or bundled context buried with multiple cached items including shell beads, mica, copper, projectile points, and/or chunkey stones. Each mound consisted of an additional series of features like post pits, burial pits, wall trench or post-hole buildings, and stage surfaces.

In the context of Wilson Mound, a series of two buildings and at least one large post pit punctuated the construction sequence. At Mound 72, at least one structure, one post pit, a series of burial pits and features, and two midden features marked different construction episodes. Powell Mound consisted of at least one large post pit and two mortuary features dug into the remains of two dismantled buildings, which marked the middle stage of construction; Rattlesnake Mound culminated with a late addition building re-orienting this mortuary space to Cahokia's Stirling phase alignment (AD 1100-1200).

In addition to the ridge-tops located in the Cahokia precinct, The Big Mound, Mitchell Mound, and Cemetery Mound (located in the St. Louis, Mitchell and East St. Louis precincts) were likely constructed during the Stirling phase. Although not much is known of these monuments due to their destruction prior to archaeological excavation, reports of human remains interred in similar contexts as those discussed above, as well as the inclusion of marine shell beads, unique objects like the Long Nosed God maskettes, and copper items demonstrate similarities shared among all known Cahokian ridge-tops (see Chapter 4). Ultimately, ridge-top mortuary practices began ca. AD 1050 and culminated ca. AD 1150 (with potential outlier [Mitchell Mound] dating to the late Stirling/Moorehead phase) spanning the height of Cahokia's domination of the American Bottom floodplain. I argue that these data indicate a shared practice and understanding of how "religion was practiced not professed" which was inherent to Cahokia's beginnings as a city (Pauketat 2013a: 190).

FINAL THOUGHTS

Ridge-top mounds were not chronologically sequential events neatly bound to individual time periods with Mound 72 beginning the series and ending with the construction of Mitchell Mound. Rather, when examined as part of complexities of practice and event, ridge-top mounds overlapped one another. In fact Mound 72 and Wilson Mound were very likely contemporaneous events coupled with the construction of Rattlesnake Mound and Mound 49. If we think about the sheer volume of earth moved during Cahokia's beginnings and the fact that this massive effort to transform the natural topography into a populated city directly incorporated the construction of a central raised causeway, at least four ridge-top mortuary mounds at AD 1050 and the burial of over 400 individuals (from Rattlesnake Mound, Wilson Mound, and Mound 72) over the course of 150 years, this begs the question: what encouraged Cahokian's to do all this in a relatively short period of time?

Pauketat (2013a: 190, emphasis added) most recently concludes that religion, at least for Native North Americans at Cahokia, was "*not* a set of beliefs per se, but a way of living with the past, in the present toward the future." This means that Cahokians actively created their religion, not so much by believing alone, but by living it, by carrying it with them in the bundles of human remains, by building it into the landscape through earthen mounds and causeways and through the physical transformation of the natural landscape, and by performing it. Tim Ingold (2013: 749) sums this perspective up best when he says, "[t]o read the land, for them [Native North Americans], is to attend to the multiple clues that reveal the activities and intentions of its manifold human and more-than-human inhabitants." This is the complexity of religion I mentioned I would be searching for in Chapter 3; it is indigenous, it is practiced, lived, and experienced.

At the beginning of this dissertation I set out to decipher Cahokia's beginnings in relation to ridge-top mortuary practice and the introduction of a new religion. I argue that the combination of data regarding the intentional restructuring of both the natural and previously inhabited landscapes, which directly incorporated the addition of 17 total (7 of which were excavated) ridge-top mounds and the construction of the Rattlesnake Causeway support my hypothesis that Cahokia's beginnings, in part, were intimately bundled with ridge-top mortuary practice as the embodiment and practice of a new religion. This new religion was centered on the dead, human and other-than-human persons, and the land. As part of this religion, practices and events that occurred at ridge-tops and along the causeway were generative of cultural change where the events that took place at all of the aforementioned locals created a new way of being for peoples living in and coming to the American Bottom. People brought with them their dead and ancestors, their pottery and projectile points, and their ways of being, literally burying them in these new ridge-top mounds. Where others (see for review Pauketat 2010; see also Brown 2010; Goldstein 2000; Milner 1984; Porubcan 2000) have regarded ridge-tops as tableaus, cosmograms, performances of political power, and elite mortuaries I have focused on ridge-tops as complexities of practices, beliefs, burials and construction events. Through a New Animism focus that engages with both the macro and micro scales I provided evidence to address both the variability and similarity expressed across ridge-top mounds from Downtown Cahokia across the Mississippi River to St. Louis.

I have chosen not to address the economic, political or hierarchical aspects of Cahokia's emergence because ultimately, I do not think such topics, when considered as isolated from religion, can provide a dynamic way of viewing past relationships, nor do such perspectives provide a complete picture of what Cahokia was. Instead, I focused on the complexity of religion, rather than the complex society of Cahokia, looking to theories that consider the relationality of practice, place and experience. From a 'New Animism' approach, the relationships Native North American societies create and live were/are intrinsically different than post-Enlightenment thinkers who focused on the progression of societies from less to more complex (see Fowles 2013). Again, Deloria (2003) speaks to this divergence recognizing that Native American persons 'religion' is embedded in the places around them, it is a reality in and of itself because it is tied to place and history; religion in this way is a complexity of things, people, places, events, and actions. I examined one component of this Cahokian religion (death and burial) as bundled with the land and the emergence of this city. Doubtless, this religion was limited to ridge-top mortuaries but, more likely extended to and encompassed every aspect of one's life. If we remember the beginning of this dissertation religion, for some Native American persons, was not a structured thing bound to a particular church or temporality but a combination, nay a complexity, of experiences that varied by places, times, and events (see Fowles 2013; see also Deloria 2003). Not everything was a heightened 'religious' experience all of the time, but rather, like the weather-worn rocks and the traveling bones moving across the Standing Rock Reservation, were part of one's experience with people (both human and otherwise) and the land.

Ridge-tops are dynamic spaces to examine this variability of relationships because they were simultaneously communal and performative as well as individual. By that, I mean that the burial of the dead and the construction of the earthen mounds provided a place for Native Cahokian's to experience a multitude of relations: with their ancestor, with the other living participants, with the onlookers, with the land, and with their own beliefs. Ridge-tops are one intense complexity of things! Even if we limit this analysis to one ridge-top this is evidenced in the many sustained events that occurred over the course of its use. If we expand this analysis, as I have, to include all of the excavated ridge-tops at Cahokia then these relationships become much more entangled and complex. When we include these mounds within the chronology of Cahokia's beginnings an entirely different picture emerges, one that incorporates hundreds of local and non-local persons in the process of building something new with historical ties to beliefs traceable to the Hopewell and even the Archaic periods (see Pauketat 2013a; see Chapter 1). Again, the 'new' religion I speak of here is not new in the sense of beliefs, so much as the scale and embodiment of those beliefs in the transformation of the American Bottom floodplain into a complex, mortuary landscape. It was this transformation that, in part, created Cahokia.

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APPENDIX A: WILSON MOUND SHELL BEAD MEASUREMENTS

Table A.1 Wislon Mound Bundle #16 Disk Beads

Artifact Type	Length (mm)	Thickness (mm)	Drill Hole Diameter (mm)
Disk Bead	24.38	3.35	3.85
Disk Bead	12.51	3.81	2.69
Disk Bead	13.66	3.54	2.94
Disk Bead	13.01	7.85	4.61
Disk Bead	10.59	2.24	2.70
Disk Bead	14.93	5.92	5.14
Disk Bead	14.23	3.63	3.29
Disk Bead	16.28	3.04	3.02
Disk Bead	14.43	2.94	3.44
Disk Bead	15.21	3.69	4.24
Disk Bead	15.81	5.09	5.15
Disk Bead	15.36	9.00	3.42
Disk Bead	19.86	4.53	3.71
Disk Bead	14.60	4.99	3.03
Disk Bead	12.08	3.92	4.09
Disk Bead	10.11	1.83	2.41
Disk Bead	24.53	5.29	4.71
Disk Bead	11.30	4.30	3.19
Disk Bead	15.80	4.79	3.97
Disk Bead	19.01	3.94	3.33
Disk Bead	19.11	2.79	3.30
Disk Bead	16.42	4.79	4.01
Disk Bead	16.88	3.39	3.60
Disk Bead	13.50	1.68	3.34
Disk Bead	10.04	1.74	2.87
Disk Bead	23.97	5.51	3.54
Disk Bead	16.21	2.49	4.67
Disk Bead	13.61	2.67	2.42
Disk Bead	15.36	2.88	4.24
Disk Bead	8.03	3.62	2.71
Disk Bead	9.61	2.88	3.02
Disk Bead	20.46	5.70	4.29
Disk Bead	19.95	8.32	4.99
Disk Bead	20.14	4.65	2.89
Disk Bead	21.45	5.54	4.36
Disk Bead	19.59	4.69	9.97
Disk Bead	20.01	4.91	3.58
Disk Bead	14.95	4.51	4.64
Disk Bead	12.64	4.29	4.00
Disk Bead	18.94	2.89	3.62
Disk Bead	13.66	4.07	3.91
Disk Bead	14.21	2.48	2.63
Disk Bead	15.03	4.05	3.41
Disk Bead	12.91	6.21	3.99

Disk Bead	20.25	3.31	3.99
Disk Bead	19.68	5.11	3.36
Disk Bead	16.88	8.63	5.70
Disk Bead	24.39	5.75	3.31
Disk Bead	25.40	11.08	4.36
Disk Bead	21.94	2.85	3.25
Disk Bead	21.83	7.80	4.03
Disk Bead	24.38	5.07	5.33
Disk Bead	16.09	4.20	3.65
Disk Bead	21.91	5.71	3.42
Disk Bead	20.92	7.81	4.76
Disk Bead	20.38	3.19	5.01
Disk Bead	21.44	2.21	3.81
Disk Bead	15.46	3.17	4.07
Disk Bead	20.88	3.60	5.81
Disk Bead	11.50	3.85	4.32
Disk Bead	15.40	3.98	4.52
Disk Bead	14.06	5.49	4.09
Disk Bead	14.98	3.03	3.58
Disk Bead	14.68	3.79	4.20
Disk Bead	11.75	3.06	2.87
Disk Bead	13.97	3.73	3.72
Disk Bead	15.87	9.85	5.26
Disk Bead	24.60	5.99	5.34
Disk Bead	21.88	3.61	4.09
Disk Bead	16.02	7.79	3.99
Disk Bead	20.37	4.06	3.60
Disk Bead	19.30	3.29	3.56
Disk Bead	10.76	2.78	2.55
Disk Bead	15.56	6.50	5.10
Disk Bead	15.69	5.06	4.36
Disk Bead	8.46	1.93	2.60
Disk Bead	17.71	9.84	5.06
Disk Bead	14.41	3.75	3.58
Disk Bead	22.58	3.86	4.32
Disk Bead	20.12	5.44	5.57
Disk Bead	22.97	2.34	3.44
Disk Bead	17.29	7.10	4.86
Disk Bead	19.58	2.70	4.52
Disk Bead	14.45	3.45	5.54
Disk Bead	19.74	3.92	3.52
Disk Bead	18.05	2.92	2.91
Disk Bead	12.46	3.11	4.15
Disk Bead	13.45	5.79	3.56
Disk Bead	14.84	3.17	3.70
Disk Bead	16.03	4.38	4.75

Disk Bead	14.87	5.62	4.61
Disk Bead	18.49	3.23	3.53
Disk Bead	20.41	4.96	4.04
Disk Bead	25.51	3.61	3.59
Disk Bead	21.84	4.29	4.39
Disk Bead	23.48	3.47	4.32
Disk Bead	21.12	3.34	3.43
Disk Bead	10.24	4.24	3.71
Disk Bead	15.77	2.92	3.72
Disk Bead	15.30	3.33	3.76
Disk Bead	15.92	4.25	5.48
Disk Bead	20.63	3.23	4.88
Disk Bead	17.14	4.92	4.41
Disk Bead	21.74	9.33	4.16
Disk Bead	18.41	4.61	5.51
Disk Bead	14.49	6.05	3.73
Disk Bead	19.81	4.86	4.81
Disk Bead	26.42	6.00	5.18
Disk Bead	21.71	4.87	4.31
Disk Bead	20.45	3.30	2.83
Disk Bead	21.51	3.64	3.94
Disk Bead	21.75	3.78	4.11
Disk Bead	21.14	3.54	4.83
Disk Bead	17.50	2.17	3.55
Disk Bead	10.26	3.27	3.65
Disk Bead	9.40	2.29	3.13
Disk Bead	12.35	2.29	2.91
Disk Bead	10.32	3.21	3.42
Disk Bead	8.42	3.44	3.24
Disk Bead	15.95	2.57	3.09
Disk Bead	21.92	3.68	3.84
Disk Bead	22.11	6.79	3.87
Disk Bead	16.07	3.48	3.53
Disk Bead	23.96	5.92	4.87
Disk Bead	10.03	3.81	4.26
Disk Bead	8.91	4.48	4.47
Disk Bead	8.03	3.11	2.38
Disk Bead	10.32	4.43	3.54
Disk Bead	19.59	3.37	4.33
Disk Bead	17.08	6.69	4.64
Disk Bead	14.14	3.26	3.43
Disk Bead	14.09	3.71	3.03
Disk Bead	21.04	4.17	4.67
Disk Bead	14.04	3.11	2.88
Disk Bead	14.69	3.59	3.70
Disk Bead	10.29	2.55	3.21

Disk Bead	13.58	4.00	2.70
Disk Bead	9.60	3.18	3.73
Disk Bead	9.31	2.95	2.82
Disk Bead	10.06	2.71	2.97
Disk Bead	13.94	3.31	3.49
Disk Bead	8.85	3.37	2.86
Disk Bead	14.98	6.92	3.60
Disk Bead	10.62	2.57	2.40
Disk Bead	13.63	2.18	3.08
Disk Bead	22.11	9.05	2.84
Disk Bead	10.38	2.95	3.51
Disk Bead	14.87	2.87	3.52
Disk Bead	15.68	3.31	2.99
Disk Bead	8.07	4.44	3.19
Disk Bead	10.27	2.51	3.92
Disk Bead	9.50	3.34	2.70
Disk Bead	15.16	4.04	3.66
Disk Bead	13.83	2.80	3.00
Disk Bead	13.14	5.61	3.37
Disk Bead	9.77	3.20	3.20
Disk Bead	10.69	3.78	3.81
Disk Bead	10.74	3.98	3.72
Disk Bead	20.25	4.17	2.94
Disk Bead	22.47	13.62	10.05
Disk Bead	28.72	12.69	9.44
Disk Bead	25.55	8.50	9.10
Disk Bead	24.73	10.15	9.76
Disk Bead	22.76	14.03	9.47
Disk Bead	26.06	9.24	9.42
Disk Bead	19.44	8.01	9.32
Disk Bead	25.83	8.70	8.94
Disk Bead	28.01	9.32	9.88
Disk Bead	28.19	10.28	8.92
Disk Bead	19.07	9.94	8.75
Disk Bead	18.08	8.97	9.25
Disk Bead	22.12	11.85	10.66
Disk Bead	20.09	7.71	8.31
Disk Bead	14.01	3.84	4.51
Disk Bead	10.86	4.98	3.68
Disk Bead	12.45	3.08	2.88
Disk Bead	12.77	3.42	4.43
Disk Bead	15.95	3.37	4.37
Disk Bead	11.46	3.04	3.03
Disk Bead	10.63	2.33	2.42
Disk Bead	10.30	4.23	5.51
Disk Bead	10.98	3.20	3.71

Disk Bead	14.18	3.95	3.29
Disk Bead	9.48	2.93	2.96
Disk Bead	9.38	1.99	2.45
Disk Bead	12.00	5.46	4.01
AVERAGES (mm)	**16.49**	**4.66**	**4.26**

Broken or incomplete beads were not measured and are not included in these size averages
Total beads 185

Table A.2 Wislon Mound Bundle #24/25 Disk Beads

Artifact Type	Length (mm)	Thickness (mm)	Drill Hole Diameter (mm)
Disk Bead	19.25	5.41	3.72
Disk Bead	17.00	3.46	3.86
Disk Bead	15.62	4.17	3.02
Disk Bead	17.58	2.20	2.51
Disk Bead	16.56	3.18	4.23
Disk Bead	17.74	2.82	2.57
Disk Bead	13.38	2.95	3.43
Disk Bead	15.19	4.05	4.40
Disk Bead	16.87	3.40	2.79
Disk Bead	11.96	5.46	3.27
Disk Bead	14.63	3.90	4.13
Disk Bead	10.52	3.23	3.47
Disk Bead	10.59	2.60	3.32
Disk Bead	12.40	4.13	3.41
Disk Bead	14.21	3.61	4.74
Disk Bead	17.56	4.37	3.45
Disk Bead	13.16	5.77	4.82
Disk Bead	14.79	2.60	3.89
Disk Bead	11.92	2.85	3.77
Disk Bead	10.27	3.74	3.51
Disk Bead	12.31	2.89	3.49
Disk Bead	12.80	4.65	4.12
Disk Bead	11.79	2.08	3.25
Disk Bead	11.01	4.69	2.55
Disk Bead	12.10	4.04	3.22
Disk Bead	9.02	3.77	5.08
Disk Bead	12.29	3.15	3.68
Disk Bead	11.87	3.16	3.44
Disk Bead	12.39	3.32	3.68
Disk Bead	12.88	3.66	3.34
Disk Bead	29.46	7.40	4.85
Disk Bead	21.72	4.03	3.06
Disk Bead	16.54	6.26	3.60
Disk Bead	16.24	3.14	3.94
Disk Bead	18.26	3.50	3.51
Disk Bead	15.90	7.30	4.68
Disk Bead	11.15	5.52	3.01
Disk Bead	9.91	7.03	3.29
Disk Bead	12.73	3.23	3.95
Disk Bead	15.82	5.47	3.35
Disk Bead	14.32	5.20	3.87
Disk Bead	10.50	3.91	3.44
Disk Bead	14.25	3.01	3.56
Disk Bead	17.77	3.60	3.27

Disk Bead	10.85	3.34	3.02
Disk Bead	17.27	4.64	4.30
Disk Bead	15.06	3.29	4.27
Disk Bead	12.81	2.92	3.90
Disk Bead	11.03	4.84	3.96
Disk Bead	15.27	3.95	4.72
Disk Bead	13.15	2.77	4.42
Disk Bead	5.51	3.80	3.34
Disk Bead	12.01	2.52	2.77
Disk Bead	22.55	5.34	3.91
Disk Bead	16.75	4.72	4.95
Disk Bead	19.10	2.49	2.80
Disk Bead	21.09	6.09	4.19
Disk Bead	20.51	3.74	3.86
Disk Bead	16.25	2.91	4.47
Disk Bead	13.49	3.46	2.78
Disk Bead	19.85	5.42	4.26
Disk Bead	17.10	2.46	3.57
Disk Bead	16.87	4.77	5.72
Disk Bead	16.11	5.36	4.37
Disk Bead	13.16	5.73	3.42
Disk Bead	14.19	3.02	3.73
Disk Bead	14.16	6.56	3.74
Disk Bead	20.49	3.71	3.82
Disk Bead	15.06	2.32	3.87
Disk Bead	11.03	3.63	3.62
Disk Bead	10.68	4.26	3.37
Disk Bead	10.32	4.02	3.24
Disk Bead	8.71	5.68	3.37
Disk Bead	12.10	1.64	2.56
Disk Bead	17.15	2.83	6.11
Disk Bead	9.59	2.06	2.54
Disk Bead	7.81	3.64	2.88
Disk Bead	10.24	4.33	3.53
Disk Bead	11.92	3.00	3.60
Disk Bead	14.30	2.33	2.62
Disk Bead	15.92	4.10	3.56
Disk Bead	10.65	3.64	3.14
Disk Bead	10.63	3.14	2.98
Disk Bead	22.06	8.82	4.76
Disk Bead	19.30	9.81	5.25
Disk Bead	17.93	3.87	5.05
Disk Bead	15.58	5.51	5.27
Disk Bead	12.58	3.03	3.63
Disk Bead	13.51	2.86	3.56
Disk Bead	19.50	4.16	4.99

Disk Bead	10.68	3.37	3.11
Disk Bead	14.90	3.27	4.23
Disk Bead	14.21	3.57	3.87
Disk Bead	13.98	2.65	3.14
Disk Bead	15.51	3.75	2.96
Disk Bead	9.95	3.62	4.73
Disk Bead	12.50	3.35	3.24
Disk Bead	15.44	3.44	3.73
Disk Bead	15.44	3.47	3.46
Disk Bead	12.07	2.66	3.21
Disk Bead	9.27	4.60	3.54
Disk Bead	9.98	4.06	2.72
Disk Bead	13.00	2.90	4.09
Disk Bead	15.23	3.15	2.99
Disk Bead	12.15	3.30	4.04
Disk Bead	9.55	3.10	3.43
Disk Bead	9.22	4.34	3.28
Disk Bead	11.97	4.47	3.15
Disk Bead	10.48	2.02	2.38
Disk Bead	12.27	3.59	2.50
Disk Bead	26.53	6.74	3.94
Disk Bead	20.09	2.79	4.39
Disk Bead	16.87	7.70	7.48
Disk Bead	21.28	5.74	3.97
Disk Bead	18.49	7.81	4.14
Disk Bead	17.12	5.57	4.63
Disk Bead	19.39	3.21	2.96
Disk Bead	18.53	4.99	4.76
Disk Bead	26.16	10.49	4.91
Disk Bead	15.92	3.58	4.82
Disk Bead	13.30	5.36	3.20
Disk Bead	13.74	3.46	2.66
Disk Bead	10.82	2.65	3.39
Disk Bead	18.91	2.97	3.24
Disk Bead	11.50	1.89	2.76
Disk Bead	18.56	5.09	3.98
Disk Bead	9.48	3.56	3.04
Disk Bead	13.08	3.11	3.55
Disk Bead	14.39	4.96	4.35
Disk Bead	15.62	3.05	2.75
Disk Bead	9.94	3.94	3.19
Disk Bead	9.60	3.21	3.23
Disk Bead	10.49	3.91	3.25
Disk Bead	8.63	3.35	3.02
Disk Bead	11.60	1.83	2.67
Disk Bead	11.71	5.27	4.55

Disk Bead	11.47	4.51	3.57
Disk Bead	23.17	8.07	4.82
Disk Bead	23.38	5.78	4.09
Disk Bead	30.46	6.08	5.39
Disk Bead	20.11	7.45	5.37
Disk Bead	20.37	5.54	3.53
Disk Bead	20.78	5.59	3.99
Disk Bead	22.38	5.56	5.51
Disk Bead	20.94	7.62	4.18
Disk Bead	17.19	4.04	5.08
Disk Bead	17.87	2.29	3.06
Disk Bead	16.86	5.78	3.41
Disk Bead	16.42	3.94	3.15
Disk Bead	18.24	5.01	4.68
Disk Bead	16.99	3.26	3.15
Disk Bead	15.91	3.21	5.61
Disk Bead	15.61	3.86	3.74
Disk Bead	11.67	4.37	4.03
Disk Bead	14.32	5.46	4.94
Disk Bead	13.95	6.82	5.33
Disk Bead	17.00	2.92	3.97
Disk Bead	17.27	4.05	2.79
Disk Bead	18.13	3.87	3.97
Disk Bead	18.52	8.06	3.40
Disk Bead	17.70	1.85	3.11
Disk Bead	16.15	3.74	4.43
Disk Bead	17.20	4.24	2.73
Disk Bead	9.13	4.53	3.07
Disk Bead	10.14	2.19	2.71
Disk Bead	13.31	4.03	3.91
Disk Bead	18.58	5.07	2.51
Disk Bead	13.78	4.87	3.41
Disk Bead	12.47	3.31	3.50
Disk Bead	11.99	3.44	3.79
Disk Bead	9.48	7.02	4.11
Disk Bead	8.98	2.59	3.57
Disk Bead	14.11	2.08	3.07
Disk Bead	19.19	2.61	2.86
Disk Bead	14.96	4.55	3.98
Disk Bead	15.34	3.03	3.31
Disk Bead	12.89	3.81	2.82
Disk Bead	17.07	3.83	3.97
Disk Bead	10.03	2.57	3.71
Disk Bead	14.79	4.00	3.37
Disk Bead	14.09	3.80	5.15
Disk Bead	8.12	3.01	3.30

Disk Bead	11.47	4.51	3.57
Disk Bead	23.17	8.07	4.82
Disk Bead	23.38	5.78	4.09
Disk Bead	30.46	6.08	5.39
Disk Bead	20.11	7.45	5.37
Disk Bead	20.37	5.54	3.53
Disk Bead	20.78	5.59	3.99
Disk Bead	22.38	5.56	5.51
Disk Bead	20.94	7.62	4.18
Disk Bead	17.19	4.04	5.08
Disk Bead	17.87	2.29	3.06
Disk Bead	16.86	5.78	3.41
Disk Bead	16.42	3.94	3.15
Disk Bead	18.24	5.01	4.68
Disk Bead	16.99	3.26	3.15
Disk Bead	15.91	3.21	5.61
Disk Bead	15.61	3.86	3.74
Disk Bead	11.67	4.37	4.03
Disk Bead	14.32	5.46	4.94
Disk Bead	13.95	6.82	5.33
Disk Bead	17.00	2.92	3.97
Disk Bead	17.27	4.05	2.79
Disk Bead	18.13	3.87	3.97
Disk Bead	18.52	8.06	3.40
Disk Bead	17.70	1.85	3.11
Disk Bead	16.15	3.74	4.43
Disk Bead	17.20	4.24	2.73
Disk Bead	9.13	4.53	3.07
Disk Bead	10.14	2.19	2.71
Disk Bead	13.31	4.03	3.91
Disk Bead	18.58	5.07	2.51
Disk Bead	13.78	4.87	3.41
Disk Bead	12.47	3.31	3.50
Disk Bead	11.99	3.44	3.79
Disk Bead	9.48	7.02	4.11
Disk Bead	8.98	2.59	3.57
Disk Bead	14.11	2.08	3.07
Disk Bead	19.19	2.61	2.86
Disk Bead	14.96	4.55	3.98
Disk Bead	15.34	3.03	3.31
Disk Bead	12.89	3.81	2.82
Disk Bead	17.07	3.83	3.97
Disk Bead	10.03	2.57	3.71
Disk Bead	14.79	4.00	3.37
Disk Bead	14.09	3.80	5.15
Disk Bead	8.12	3.01	3.30

Disk Bead	18.50	3.10	3.98
Disk Bead	18.48	9.48	4.02
Disk Bead	21.21	3.69	4.14
Disk Bead	17.53	4.98	4.31
Disk Bead	18.64	6.54	4.32
Disk Bead	18.48	7.10	4.20
Disk Bead	17.56	6.89	5.71
Disk Bead	18.71	6.29	5.56
Disk Bead	17.85	3.80	3.04
Disk Bead	17.34	2.66	2.65
Disk Bead	14.39	2.90	4.51
Disk Bead	14.37	3.73	3.87
Disk Bead	19.97	6.13	3.91
Disk Bead	15.02	3.78	4.64
Disk Bead	15.06	6.44	3.96
Disk Bead	13.29	2.11	3.13
Disk Bead	10.77	4.01	2.83
Disk Bead	13.96	4.35	4.91
Disk Bead	11.65	3.81	3.98
Disk Bead	15.24	4.11	4.33
Disk Bead	11.92	5.66	5.60
Disk Bead	12.28	4.66	4.30
Disk Bead	17.18	3.51	3.65
Disk Bead	10.70	2.79	3.55
Disk Bead	11.07	1.73	2.37
Disk Bead	9.79	2.79	3.27
Disk Bead	13.13	2.40	3.63
Disk Bead	14.15	5.86	3.77
Disk Bead	19.03	4.83	3.36
Disk Bead	12.47	5.52	3.83
Disk Bead	14.74	4.56	4.19
Disk Bead	17.59	11.00	6.10
Disk Bead	16.41	2.81	3.41
Disk Bead	18.67	5.22	3.55
Disk Bead	15.50	2.35	2.48
Disk Bead	16.61	4.49	3.57
Disk Bead	18.88	5.81	4.07
Disk Bead	16.48	3.05	3.42
Disk Bead	16.66	1.52	2.99
Disk Bead	12.46	4.39	2.98
Disk Bead	12.07	4.66	2.89
Disk Bead	18.17	4.42	4.37
Disk Bead	11.83	4.60	3.24
Disk Bead	13.21	3.47	3.16
Disk Bead	17.21	5.44	5.47
Disk Bead	11.54	2.81	3.91

Disk Bead	9.67	3.34	4.21
Disk Bead	17.92	6.54	3.64
Disk Bead	12.08	5.24	3.70
Disk Bead	17.61	2.12	3.31
Disk Bead	15.82	3.67	3.41
Disk Bead	19.74	3.28	3.34
Disk Bead	22.14	5.53	5.00
Disk Bead	15.51	4.16	3.80
Disk Bead	17.38	3.03	3.71
Disk Bead	23.57	2.72	3.45
Disk Bead	15.88	5.90	4.72
Disk Bead	19.51	10.18	4.36
Disk Bead	18.62	2.33	3.88
Disk Bead	15.48	3.90	3.50
Disk Bead	16.31	2.50	3.93
Disk Bead	11.42	4.04	3.63
Disk Bead	12.68	6.10	4.11
Disk Bead	9.94	3.83	3.85
Disk Bead	15.20	4.96	4.22
Disk Bead	12.49	4.20	3.15
Disk Bead	11.51	6.38	3.99
Disk Bead	9.56	5.57	4.00
Disk Bead	14.23	3.01	3.95
AVERAGES (mm)	**14.67**	**4.18**	**3.73**

Broken or incomplete beads were not measured and are not included in these size averages
Total beads 296

Table A.3 Wislon Mound Bundle #25 Disk Beads

Artifact Type	Length (mm)	Thickness (mm)	Drill Hole Diameter (mm)
Disk Bead	15.69	5.89	4.76
Disk Bead	20.83	8.50	6.23
Disk Bead	13.85	4.13	3.94
Disk Bead	16.50	3.37	3.15
Disk Bead	18.05	5.46	4.71
Disk Bead	20.09	3.23	4.33
Disk Bead	18.24	2.13	4.17
Disk Bead	14.60	2.28	3.82
Disk Bead	17.97	1.02	2.88
Disk Bead	11.87	3.32	5.32
Disk Bead	20.47	3.81	3.53
Disk Bead	19.63	4.14	3.95
Disk Bead	19.12	9.30	4.42
Disk Bead	19.16	6.07	5.23
Disk Bead	18.58	8.29	5.01
Disk Bead	16.93	3.99	5.34
Disk Bead	21.28	3.48	4.05
Disk Bead	15.76	4.84	4.84
Disk Bead	19.65	4.87	4.70
Disk Bead	15.06	3.14	4.32
Disk Bead	13.29	3.74	3.61
Disk Bead	14.92	2.88	3.32
Disk Bead	13.44	3.75	3.84
Disk Bead	15.91	2.68	3.98
Disk Bead	18.88	5.00	4.25
Disk Bead	20.97	3.95	2.81
Disk Bead	19.27	10.83	4.81
Disk Bead	21.11	4.94	4.44
Disk Bead	26.21	2.61	5.90
Disk Bead	18.01	6.53	4.14
Disk Bead	15.60	5.30	4.49
Disk Bead	12.67	3.24	3.41
Disk Bead	13.88	3.61	3.76
Disk Bead	14.24	4.13	3.85
Disk Bead	16.61	5.68	4.89
Disk Bead	15.44	5.33	5.40
Disk Bead	17.75	4.18	5.42
Disk Bead	17.34	5.42	4.44
Disk Bead	15.34	7.02	4.31
Disk Bead	15.64	3.38	3.53
Disk Bead	18.98	2.98	3.18
Disk Bead	17.45	2.79	3.81
Disk Bead	12.50	2.51	2.72
Disk Bead	16.92	5.69	4.96

Disk Bead	12.54	2.71	3.40
Disk Bead	15.84	3.91	4.69
Disk Bead	12.36	3.20	3.71
Disk Bead	16.64	4.44	4.59
Disk Bead	16.77	6.73	6.82
Disk Bead	13.18	3.75	3.46
Disk Bead	20.35	2.32	3.86
Disk Bead	17.15	5.66	5.84
Disk Bead	14.96	5.58	4.02
Disk Bead	16.32	2.47	4.25
Disk Bead	17.20	3.62	3.71
Disk Bead	15.54	3.88	3.99
Disk Bead	15.97	4.69	4.56
Disk Bead	15.15	2.88	3.44
Disk Bead	9.09	6.24	3.54
Disk Bead	12.34	4.14	4.42
Disk Bead	16.43	3.26	3.26
Disk Bead	13.95	2.93	3.60
Disk Bead	10.39	3.58	3.34
Disk Bead	10.53	3.35	4.14
Disk Bead	11.11	3.52	4.25
Disk Bead	13.45	2.75	3.61
Disk Bead	11.13	4.06	3.75
Disk Bead	4.66	3.55	5.40
Disk Bead	10.87	2.67	3.21
Disk Bead	12.52	4.95	4.13
Disk Bead	10.45	3.45	3.67
Disk Bead	11.39	3.72	3.30
Disk Bead	9.07	3.37	3.38
Disk Bead	8.11	2.94	2.68
Disk Bead	9.43	2.00	3.07
Disk Bead	11.17	4.28	5.50
Disk Bead	17.83	3.35	4.12
Disk Bead	19.25	5.21	4.28
Disk Bead	24.44	3.28	4.08
Disk Bead	17.31	4.88	5.12
Disk Bead	24.71	6.19	4.82
Disk Bead	17.53	4.06	6.16
Disk Bead	19.61	9.54	7.96
Disk Bead	17.28	3.18	3.19
Disk Bead	18.53	6.27	5.69
Disk Bead	23.28	1.89	3.50
Disk Bead	20.77	3.61	3.37
Disk Bead	21.47	3.23	3.08
Disk Bead	15.16	3.12	3.56
Disk Bead	17.96	5.64	4.14

Disk Bead	16.50	4.77	4.11
Disk Bead	15.85	5.15	5.31
Disk Bead	16.05	4.10	4.10
Disk Bead	16.68	2.99	3.63
Disk Bead	17.33	5.34	6.41
Disk Bead	12.59	3.68	3.75
Disk Bead	11.00	2.93	4.24
Disk Bead	10.47	5.18	4.12
Disk Bead	12.67	4.74	5.30
Disk Bead	18.67	8.10	5.79
Disk Bead	18.67	8.10	5.79
Disk Bead	21.50	4.70	4.55
Disk Bead	15.24	8.47	4.60
Disk Bead	13.23	4.39	4.66
Disk Bead	15.92	3.71	5.61
Disk Bead	12.88	4.32	3.34
Disk Bead	12.70	4.58	4.81
Disk Bead	13.66	3.81	3.63
Disk Bead	12.86	5.87	4.53
Disk Bead	17.98	3.94	4.47
Disk Bead	16.49	3.90	4.57
Disk Bead	14.91	3.65	3.36
Disk Bead	16.69	6.80	6.53
Disk Bead	14.01	2.66	3.81
Disk Bead	13.92	2.86	4.65
Disk Bead	10.25	2.65	4.61
Disk Bead	13.70	3.49	3.82
Disk Bead	16.75	6.07	5.13
Disk Bead	13.01	5.87	3.89
Disk Bead	14.55	2.85	3.14
Disk Bead	15.49	3.14	6.60
Disk Bead	13.23	3.34	3.90
Disk Bead	13.49	2.17	2.97
Disk Bead	10.41	3.81	2.33
Disk Bead	11.07	3.24	4.38
Disk Bead	15.08	5.87	4.25
Disk Bead	17.27	2.53	3.99
Disk Bead	17.81	6.67	4.22
Disk Bead	16.81	3.45	3.48
Disk Bead	14.48	4.77	4.28
Disk Bead	16.29	3.55	5.58
Disk Bead	10.82	2.99	3.97
Disk Bead	15.11	7.73	6.15
Disk Bead	16.25	3.00	3.34
Disk Bead	16.97	5.77	3.76
Disk Bead	18.92	4.50	5.63

Disk Bead	16.13	3.30	4.12
Disk Bead	15.01	5.37	3.87
Disk Bead	15.15	5.15	4.23
Disk Bead	12.77	5.22	4.93
Disk Bead	15.96	2.76	3.15
Disk Bead	8.34	3.53	3.36
Disk Bead	12.95	3.59	3.49
Disk Bead	14.50	5.28	4.78
Disk Bead	15.28	3.37	3.43
Disk Bead	12.52	4.56	4.58
Disk Bead	14.83	7.18	4.60
Disk Bead	10.59	3.34	2.98
Disk Bead	11.81	2.43	3.43
Disk Bead	11.07	6.10	4.27
Disk Bead	10.52	3.15	2.69
Disk Bead	10.71	2.47	3.28
Disk Bead	17.47	5.40	4.25
Disk Bead	22.92	3.16	4.50
Disk Bead	16.63	8.33	3.90
Disk Bead	17.23	6.06	3.77
Disk Bead	20.37	7.55	3.60
Disk Bead	14.87	6.28	3.33
Disk Bead	16.67	4.14	2.73
Disk Bead	12.83	4.36	4.45
Disk Bead	15.71	2.80	2.93
Disk Bead	13.23	4.24	3.57
Disk Bead	12.42	2.46	5.22
Disk Bead	14.05	5.12	4.25
Disk Bead	20.61	6.77	4.43
Disk Bead	10.42	1.84	2.44
Disk Bead	9.84	4.07	4.15
Disk Bead	30.76	6.16	4.57
Disk Bead	17.81	5.87	4.54
Disk Bead	20.31	4.06	4.39
Disk Bead	25.11	5.16	3.98
Disk Bead	22.01	5.23	4.65
Disk Bead	21.44	2.69	3.68
Disk Bead	18.34	5.45	3.83
Disk Bead	17.27	5.38	4.79
Disk Bead	10.23	4.70	4.52
Disk Bead	15.87	6.65	3.86
Disk Bead	11.97	6.19	2.95
Disk Bead	13.80	5.61	4.41
Disk Bead	11.52	5.32	4.19
Disk Bead	16.41	4.82	4.39
Disk Bead	12.40	4.37	4.39

Disk Bead	16.13	4.37	3.23
Disk Bead	12.94	6.45	4.30
Disk Bead	11.12	5.65	3.99
Disk Bead	11.30	3.04	4.60
Disk Bead	10.02	4.16	4.17
Disk Bead	10.42	3.15	3.27
Disk Bead	23.52	5.63	5.12
Disk Bead	19.62	4.37	3.96
Disk Bead	14.38	6.10	3.96
Disk Bead	20.19	6.13	4.44
Disk Bead	18.24	8.12	5.12
Disk Bead	20.02	4.31	5.34
Disk Bead	15.80	5.07	4.71
Disk Bead	15.65	4.32	4.27
Disk Bead	15.09	3.14	2.92
Disk Bead	20.35	3.46	4.91
Disk Bead	16.68	3.71	4.18
Disk Bead	25.31	9.64	4.91
Disk Bead	20.23	3.69	4.02
Disk Bead	15.38	3.81	3.18
Disk Bead	15.90	3.34	3.57
Disk Bead	14.50	2.05	2.35
Disk Bead	15.96	3.90	4.00
Disk Bead	14.75	1.88	2.53
Disk Bead	9.97	3.73	3.64
Disk Bead	11.14	4.71	3.81
Disk Bead	14.61	4.21	3.95
Disk Bead	11.07	3.24	3.99
Disk Bead	17.96	5.65	4.34
Disk Bead	14.07	5.53	4.25
Disk Bead	16.29	4.61	3.75
Disk Bead	21.27	3.55	3.87
Disk Bead	19.30	3.11	2.49
Disk Bead	18.70	5.54	3.09
Disk Bead	13.46	2.69	3.81
Disk Bead	17.70	3.01	4.95
Disk Bead	15.58	2.27	4.03
Disk Bead	18.08	3.38	3.28
Disk Bead	15.40	3.04	3.58
Disk Bead	18.09	5.72	3.54
Disk Bead	11.54	2.99	2.91
Disk Bead	15.44	3.12	4.56
Disk Bead	14.91	3.56	4.47
Disk Bead	16.19	3.06	4.82
Disk Bead	12.65	3.60	3.62
Disk Bead	15.91	6.19	3.61

Disk Bead	15.61	2.91	4.13
Disk Bead	12.45	4.83	4.92
Disk Bead	19.94	3.37	3.04
Disk Bead	12.33	4.87	4.42
Disk Bead	15.45	2.43	2.73
Disk Bead	12.40	4.97	3.37
Disk Bead	12.05	1.72	2.40
Disk Bead	11.68	3.10	3.75
Disk Bead	12.56	4.15	3.39
Disk Bead	11.94	3.42	3.37
Disk Bead	13.23	3.54	4.89
Disk Bead	19.03	2.83	3.44
Disk Bead	16.68	3.66	3.29
Disk Bead	15.85	5.07	4.61
Disk Bead	14.64	8.94	6.03
Disk Bead	18.64	5.01	4.89
Disk Bead	19.05	4.74	4.25
Disk Bead	22.17	7.86	5.27
Disk Bead	17.39	3.82	3.44
Disk Bead	12.79	5.39	3.84
Disk Bead	17.80	1.73	2.44
Disk Bead	11.66	5.06	4.03
Disk Bead	16.23	3.60	2.69
Disk Bead	13.75	4.49	3.89
Disk Bead	17.23	2.95	4.94
Disk Bead	13.51	4.21	3.82
Disk Bead	16.19	5.27	5.09
Disk Bead	22.56	6.65	5.45
Disk Bead	17.28	4.34	6.70
Disk Bead	15.47	3.29	3.83
Disk Bead	14.93	3.86	4.24
Disk Bead	16.51	2.84	5.23
Disk Bead	13.04	2.42	2.98
Disk Bead	14.28	3.63	4.42
Disk Bead	15.60	3.08	3.18
Disk Bead	16.03	4.19	4.26
Disk Bead	11.02	2.15	2.77
Disk Bead	13.69	4.07	3.92
Disk Bead	13.76	2.88	2.74
Disk Bead	10.94	5.53	4.00
Disk Bead	12.00	3.18	2.93
Disk Bead	10.72	2.86	4.41
Disk Bead	10.02	3.54	3.05
Disk Bead	13.38	5.56	3.26
Disk Bead	16.40	3.57	3.28
Disk Bead	15.00	10.79	4.12

Disk Bead	20.21	3.19	4.52
Disk Bead	28.83	7.21	7.78
Disk Bead	19.68	5.22	3.57
Disk Bead	18.16	3.63	3.41
Disk Bead	18.29	3.81	4.39
Disk Bead	16.99	5.08	4.10
Disk Bead	14.45	4.56	4.23
Disk Bead	17.82	3.61	4.45
Disk Bead	13.26	2.69	3.72
Disk Bead	15.21	5.44	7.19
Disk Bead	17.57	3.07	4.27
Disk Bead	18.22	3.14	3.84
Disk Bead	20.27	2.87	3.35
Disk Bead	19.91	5.06	4.10
Disk Bead	9.97	3.05	3.07
Disk Bead	13.58	3.61	3.39
Disk Bead	11.43	2.75	3.06
Disk Bead	12.46	2.74	3.20
Disk Bead	12.95	2.82	4.33
Disk Bead	11.40	4.64	4.43
Disk Bead	8.70	3.14	3.37
Disk Bead	10.61	9.40	3.91
Disk Bead	13.87	3.65	5.19
Disk Bead	14.50	6.88	5.57
Disk Bead	23.53	3.23	4.28
Disk Bead	13.09	3.10	4.58
Disk Bead	15.04	4.50	4.21
Disk Bead	11.66	2.66	3.57
Disk Bead	15.67	4.09	4.59
Disk Bead	19.19	3.53	4.04
Disk Bead	10.33	2.77	2.82
Disk Bead	13.27	4.05	5.38
Disk Bead	12.43	3.49	4.27
Disk Bead	9.93	2.95	3.07
Disk Bead	22.11	3.41	3.20
Disk Bead	18.25	4.31	4.23
Disk Bead	16.81	3.58	5.72
Disk Bead	18.90	7.87	4.95
Disk Bead	14.00	7.84	5.11
Disk Bead	19.36	4.26	5.15
Disk Bead	18.74	4.57	4.73
Disk Bead	14.99	8.89	4.18
Disk Bead	11.03	4.68	4.01
Disk Bead	10.72	5.67	3.88
Disk Bead	15.05	6.88	6.16
Disk Bead	9.19	2.57	2.96

Disk Bead	14.02	3.63	3.21
Disk Bead	11.43	3.27	3.33
Disk Bead	17.07	3.58	4.08
Disk Bead	18.40	4.06	3.87
Disk Bead	17.76	5.63	5.05
Disk Bead	17.08	5.03	4.99
Disk Bead	17.24	2.93	2.74
Disk Bead	15.91	4.53	3.84
Disk Bead	15.26	4.07	4.08
Disk Bead	14.22	2.19	3.14
Disk Bead	19.64	6.31	4.37
Disk Bead	17.93	3.47	4.29
Disk Bead	16.04	4.78	4.14
Disk Bead	15.49	7.33	4.34
Disk Bead	11.73	4.20	3.69
Disk Bead	16.80	6.51	4.82
Disk Bead	14.91	6.21	5.27
Disk Bead	15.70	3.28	3.64
Disk Bead	14.98	4.34	3.79
Disk Bead	11.68	6.75	3.49
Disk Bead	13.33	4.18	2.75
Disk Bead	10.02	5.66	4.11
Disk Bead	11.20	2.83	3.34
Disk Bead	13.86	5.25	3.50
Disk Bead	11.10	4.24	3.82
Disk Bead	9.09	4.10	2.88
Disk Bead	12.07	2.58	3.69
Disk Bead	11.72	2.01	2.85
Disk Bead	11.83	3.86	3.40
Disk Bead	10.57	2.28	2.39
Disk Bead	13.36	2.01	3.47
Disk Bead	13.38	2.87	4.05
Disk Bead	13.27	2.39	3.01
Disk Bead	22.06	4.35	3.81
Disk Bead	23.37	3.35	2.69
Disk Bead	18.13	4.93	4.15
Disk Bead	14.99	3.25	4.29
Disk Bead	13.28	2.75	3.98
Disk Bead	10.39	3.80	3.20
Disk Bead	12.95	9.33	3.56
Disk Bead	19.79	3.79	3.59
Disk Bead	38.02	8.09	4.59
AVERAGES (mm)	**15.50**	**4.35**	**4.10**

Broken or incomplete beads were not measured and are not included in these size averages
Total beads 361

Table A.4 Wislon Mound Bundle #25/26 Disk Beads

Artifact Type	Length (mm)	Thickness (mm)	Drill Hole Diameter (mm)
Disk Bead	19.41	4.98	3.20
Disk Bead	17.85	6.77	4.22
Disk Bead	22.52	7.50	5.67
Disk Bead	18.53	6.78	5.40
Disk Bead	17.07	3.75	4.12
Disk Bead	17.80	6.85	6.28
Disk Bead	16.81	3.32	4.76
Disk Bead	13.15	5.33	5.72
Disk Bead	17.29	4.76	5.33
Disk Bead	13.04	5.04	3.12
Disk Bead	14.04	4.02	3.91
Disk Bead	11.84	3.19	3.46
Disk Bead	13.04	3.25	2.71
Disk Bead	14.40	3.55	5.71
Disk Bead	12.98	4.45	5.87
Disk Bead	16.29	3.51	3.32
Disk Bead	15.25	6.14	3.58
Disk Bead	14.74	3.31	3.56
Disk Bead	12.92	3.69	4.18
Disk Bead	12.37	2.81	3.26
Disk Bead	15.06	2.46	2.74
Disk Bead	10.68	4.11	4.15
Disk Bead	11.48	2.54	3.68
Disk Bead	19.15	5.21	4.52
Disk Bead	24.96	4.47	4.12
Disk Bead	19.43	8.35	3.67
Disk Bead	12.98	2.86	4.03
Disk Bead	20.43	14.04	4.56
Disk Bead	18.43	7.94	5.12
Disk Bead	19.53	4.45	4.49
Disk Bead	13.31	4.45	3.12
Disk Bead	19.36	3.35	4.71
Disk Bead	11.47	1.97	2.60
Disk Bead	16.28	4.26	4.86
Disk Bead	12.46	3.91	4.43
Disk Bead	13.11	4.52	3.85
Disk Bead	14.64	4.77	5.20
Disk Bead	15.17	4.06	4.39
Disk Bead	15.68	4.96	3.14
Disk Bead	13.25	3.46	3.68
Disk Bead	15.39	4.09	3.68
Disk Bead	17.04	3.76	3.67
Disk Bead	10.58	5.62	3.97
Disk Bead	13.93	4.94	3.66

Disk Bead	13.55	3.42	3.12
Disk Bead	13.31	3.02	3.07
Disk Bead	11.12	4.75	2.91
Disk Bead	13.75	5.19	3.71
Disk Bead	11.95	3.40	4.35
Disk Bead	11.34	3.39	3.92
Disk Bead	13.64	4.69	3.91
Disk Bead	12.01	4.68	4.91
Disk Bead	12.50	2.75	4.13
Disk Bead	17.26	6.63	4.54
Disk Bead	21.37	6.13	4.26
Disk Bead	19.30	4.25	4.42
Disk Bead	27.56	5.08	4.77
Disk Bead	20.06	4.83	4.75
Disk Bead	16.51	3.86	4.09
Disk Bead	18.81	3.87	5.01
Disk Bead	23.99	8.36	6.29
Disk Bead	12.64	5.47	3.40
Disk Bead	14.26	6.52	4.04
Disk Bead	13.58	3.69	2.76
Disk Bead	12.33	2.55	4.25
Disk Bead	14.23	3.85	3.83
Disk Bead	20.14	6.81	3.80
Disk Bead	18.74	4.78	4.75
Disk Bead	18.72	5.63	4.93
Disk Bead	16.59	4.01	3.19
Disk Bead	17.78	8.39	4.38
Disk Bead	16.42	4.44	3.14
Disk Bead	15.47	4.58	3.39
Disk Bead	20.13	4.38	3.97
Disk Bead	14.06	2.05	3.56
Disk Bead	16.03	4.60	3.41
Disk Bead	20.66	2.99	3.40
Disk Bead	20.22	7.58	6.53
Disk Bead	15.48	7.55	3.89
Disk Bead	17.39	5.85	4.40
Disk Bead	16.00	5.97	4.67
Disk Bead	21.25	3.80	4.46
Disk Bead	13.82	2.39	3.97
Disk Bead	13.77	3.71	4.10
Disk Bead	15.09	2.03	3.07
Disk Bead	11.00	5.09	4.56
Disk Bead	11.84	6.44	2.74
Disk Bead	11.53	2.37	3.35
Disk Bead	19.11	5.33	4.31
Disk Bead	20.53	3.24	4.07

Disk Bead	10.38	4.92	3.30
Disk Bead	16.96	5.30	4.40
Disk Bead	13.96	5.01	5.85
Disk Bead	14.60	4.95	4.28
Disk Bead	17.58	4.44	3.21
Disk Bead	17.04	6.57	3.75
Disk Bead	12.77	3.98	3.19
Disk Bead	20.19	3.38	4.60
Disk Bead	14.24	3.26	4.00
Disk Bead	11.99	3.60	3.56
Disk Bead	10.60	2.17	3.69
Disk Bead	16.44	6.78	4.30
Disk Bead	16.53	7.26	3.76
Disk Bead	14.54	6.17	4.84
Disk Bead	16.69	4.29	4.93
Disk Bead	15.26	4.22	3.62
Disk Bead	15.04	3.93	4.14
Disk Bead	9.37	4.72	3.91
Disk Bead	11.12	3.82	3.73
Disk Bead	19.45	6.48	3.27
Disk Bead	33.14	8.16	5.19
Disk Bead	19.81	6.46	4.63
Disk Bead	17.24	7.10	4.30
Disk Bead	9.13	4.30	3.25
Disk Bead	14.93	4.26	4.78
Disk Bead	21.36	4.19	3.71
Disk Bead	15.83	5.10	2.87
Disk Bead	15.41	3.24	3.51
Disk Bead	19.08	3.64	3.47
Disk Bead	10.78	4.16	3.58
Disk Bead	16.18	4.29	4.75
Disk Bead	17.09	3.70	4.35
Disk Bead	31.09	8.03	5.81
Disk Bead	18.27	8.22	3.39
Disk Bead	20.23	4.07	3.39
Disk Bead	20.25	9.15	7.48
Disk Bead	16.28	4.97	4.50
Disk Bead	16.69	8.14	4.49
Disk Bead	12.80	2.93	3.80
Disk Bead	13.78	5.72	3.24
Disk Bead	15.32	4.24	4.27
Disk Bead	11.99	3.46	3.67
Disk Bead	28.65	3.57	3.93
Disk Bead	18.56	6.23	4.83
Disk Bead	16.57	6.10	4.74
Disk Bead	24.93	7.45	4.87

Disk Bead	10.38	4.92	3.30
Disk Bead	16.96	5.30	4.40
Disk Bead	13.96	5.01	5.85
Disk Bead	14.60	4.95	4.28
Disk Bead	17.58	4.44	3.21
Disk Bead	17.04	6.57	3.75
Disk Bead	12.77	3.98	3.19
Disk Bead	20.19	3.38	4.60
Disk Bead	14.24	3.26	4.00
Disk Bead	11.99	3.60	3.56
Disk Bead	10.60	2.17	3.69
Disk Bead	16.44	6.78	4.30
Disk Bead	16.53	7.26	3.76
Disk Bead	14.54	6.17	4.84
Disk Bead	16.69	4.29	4.93
Disk Bead	15.26	4.22	3.62
Disk Bead	15.04	3.93	4.14
Disk Bead	9.37	4.72	3.91
Disk Bead	11.12	3.82	3.73
Disk Bead	19.45	6.48	3.27
Disk Bead	33.14	8.16	5.19
Disk Bead	19.81	6.46	4.63
Disk Bead	17.24	7.10	4.30
Disk Bead	9.13	4.30	3.25
Disk Bead	14.93	4.26	4.78
Disk Bead	21.36	4.19	3.71
Disk Bead	15.83	5.10	2.87
Disk Bead	15.41	3.24	3.51
Disk Bead	19.08	3.64	3.47
Disk Bead	10.78	4.16	3.58
Disk Bead	16.18	4.29	4.75
Disk Bead	17.09	3.70	4.35
Disk Bead	31.09	8.03	5.81
Disk Bead	18.27	8.22	3.39
Disk Bead	20.23	4.07	3.39
Disk Bead	20.25	9.15	7.48
Disk Bead	16.28	4.97	4.50
Disk Bead	16.69	8.14	4.49
Disk Bead	12.80	2.93	3.80
Disk Bead	13.78	5.72	3.24
Disk Bead	15.32	4.24	4.27
Disk Bead	11.99	3.46	3.67
Disk Bead	28.65	3.57	3.93
Disk Bead	18.56	6.23	4.83
Disk Bead	16.57	6.10	4.74
Disk Bead	24.93	7.45	4.87

Disk Bead	18.98	3.39	3.62
Disk Bead	20.30	3.52	4.32
Disk Bead	17.72	6.24	5.12
Disk Bead	17.44	6.41	3.67
Disk Bead	19.11	3.21	3.27
Disk Bead	20.53	4.92	3.57
Disk Bead	18.11	3.28	3.61
Disk Bead	13.76	3.54	3.73
Disk Bead	13.69	3.39	4.24
Disk Bead	15.52	5.50	3.80
Disk Bead	18.92	9.92	3.83
Disk Bead	12.42	4.00	4.83
Disk Bead	17.23	7.80	5.63
Disk Bead	14.12	4.64	4.94
Disk Bead	13.35	4.44	4.44
Disk Bead	18.42	7.38	4.63
Disk Bead	13.61	5.74	3.26
Disk Bead	9.91	4.05	3.30
Disk Bead	11.46	4.88	3.99
Disk Bead	14.85	2.95	2.92
Disk Bead	14.43	3.00	3.43
Disk Bead	12.59	3.18	3.81
Disk Bead	13.46	2.04	2.38
Disk Bead	14.07	2.89	4.09
Disk Bead	15.04	4.62	5.34
Disk Bead	15.21	3.23	3.94
Disk Bead	14.22	4.28	5.09
Disk Bead	13.57	5.65	2.44
Disk Bead	12.49	2.09	2.91
Disk Bead	9.68	2.62	2.88
Disk Bead	26.70	6.25	4.89
Disk Bead	14.11	6.44	5.11
Disk Bead	14.72	5.67	4.06
Disk Bead	21.02	2.60	3.24
Disk Bead	11.93	2.94	3.12
Disk Bead	13.47	3.78	4.55
Disk Bead	18.66	4.44	3.35
Disk Bead	13.61	4.43	4.01
Disk Bead	20.80	3.90	5.61
Disk Bead	9.98	4.09	3.40
Disk Bead	12.98	4.73	4.12
Disk Bead	13.07	4.10	3.63
Disk Bead	12.40	4.82	4.08
Disk Bead	16.73	3.58	5.55
Disk Bead	16.91	2.25	3.34
Disk Bead	14.97	2.80	4.60

Disk Bead	14.47	4.80	4.91
Disk Bead	15.70	3.47	3.36
Disk Bead	15.97	4.58	3.72
Disk Bead	12.31	3.92	4.33
Disk Bead	14.40	6.43	3.17
Disk Bead	23.66	4.24	5.69
Disk Bead	21.28	8.48	4.95
Disk Bead	15.72	3.73	3.07
Disk Bead	17.80	5.46	3.61
Disk Bead	13.61	4.66	3.89
Disk Bead	18.37	3.61	5.38
Disk Bead	23.03	2.16	3.89
Disk Bead	15.18	5.51	4.81
Disk Bead	14.09	3.63	4.43
Disk Bead	12.07	7.75	3.75
Disk Bead	18.33	3.89	3.64
Disk Bead	12.45	3.83	4.08
Disk Bead	16.92	3.76	3.37
Disk Bead	8.69	5.97	3.77
Disk Bead	12.76	5.00	3.12
Disk Bead	15.58	2.49	3.29
Disk Bead	15.55	2.13	3.03
Disk Bead	17.55	4.73	3.72
Disk Bead	13.20	4.49	4.17
Disk Bead	12.44	2.76	3.68
Disk Bead	15.81	2.61	3.78
Disk Bead	9.84	5.46	3.07
Disk Bead	11.14	2.50	2.81
Disk Bead	12.24	2.97	4.30
Disk Bead	11.58	3.17	3.56
Disk Bead	7.81	3.09	2.76
Disk Bead	8.38	2.75	2.96
Disk Bead	19.75	6.07	5.36
Disk Bead	24.96	4.11	3.54
Disk Bead	17.33	4.01	4.31
Disk Bead	19.62	5.21	4.20
Disk Bead	19.31	4.52	5.72
Disk Bead	13.63	5.52	4.48
Disk Bead	14.12	7.42	4.62
Disk Bead	13.99	3.52	3.13
Disk Bead	15.50	3.16	3.41
Disk Bead	17.63	5.05	3.97
Disk Bead	14.97	5.50	3.78
Disk Bead	11.79	3.99	3.67
Disk Bead	18.21	2.28	5.00
Disk Bead	25.26	6.55	5.65

Disk Bead	17.24	8.25	4.54
Disk Bead	17.97	4.78	4.56
Disk Bead	24.69	3.83	3.56
Disk Bead	12.62	2.77	3.23
Disk Bead	20.81	8.46	5.57
Disk Bead	18.47	5.25	5.72
Disk Bead	19.25	5.49	4.38
Disk Bead	17.50	4.47	2.89
Disk Bead	11.87	2.92	4.55
Disk Bead	15.23	5.18	6.43
Disk Bead	15.97	4.80	4.73
Disk Bead	23.90	4.95	4.29
Disk Bead	18.32	4.18	4.12
Disk Bead	16.12	3.01	3.73
Disk Bead	11.51	7.90	5.79
Disk Bead	13.75	3.42	3.46
Disk Bead	23.65	3.77	3.99
Disk Bead	16.80	4.45	4.48
Disk Bead	12.56	3.48	3.53
Disk Bead	12.93	3.44	4.36
Disk Bead	14.07	2.64	3.10
Disk Bead	12.27	1.87	3.90
Disk Bead	11.93	2.65	4.49
Disk Bead	18.25	5.87	4.85
Disk Bead	19.86	3.40	3.57
Disk Bead	12.92	1.53	3.38
Disk Bead	12.75	2.66	4.05
Disk Bead	11.44	3.56	3.68
Disk Bead	12.78	6.22	3.33
Disk Bead	10.32	4.26	3.64
Disk Bead	11.76	4.76	4.10
Disk Bead	3.89	3.80	3.99
Disk Bead	21.25	4.56	4.09
Disk Bead	14.31	3.62	3.26
Disk Bead	12.67	3.45	2.54
Disk Bead	14.93	3.02	5.21
Disk Bead	12.14	3.01	5.44
Disk Bead	10.02	3.41	4.03
Disk Bead	12.87	1.68	3.56
Disk Bead	14.38	3.17	3.39
Disk Bead	11.27	1.93	3.05
Disk Bead	8.98	2.35	2.35
Disk Bead	10.26	2.93	3.46
Disk Bead	25.78	3.58	3.97
Disk Bead	19.48	3.04	4.99
Disk Bead	19.15	4.11	5.42

Disk Bead	21.77	2.82	3.68
Disk Bead	17.19	2.64	4.21
Disk Bead	17.80	5.17	5.41
Disk Bead	12.82	6.15	3.91
Disk Bead	9.52	4.45	3.19
Disk Bead	13.29	4.56	3.48
Disk Bead	10.03	3.77	2.82
Disk Bead	14.14	4.67	3.03
Disk Bead	9.63	4.50	3.63
Disk Bead	18.14	6.22	5.36
Disk Bead	14.95	6.81	4.58
Disk Bead	23.37	6.90	6.77
Disk Bead	10.97	4.46	4.36
Disk Bead	15.80	3.31	4.55
Disk Bead	13.53	3.46	4.49
Disk Bead	25.54	6.72	4.39
Disk Bead	19.92	3.55	4.60
Disk Bead	18.03	4.15	3.21
Disk Bead	17.45	5.18	4.83
Disk Bead	15.10	3.63	2.85
Disk Bead	15.97	3.77	3.32
Disk Bead	12.69	4.08	4.93
Disk Bead	13.86	4.05	4.07
Disk Bead	18.14	5.08	3.75
Disk Bead	11.55	3.18	2.95
Disk Bead	13.61	2.30	3.52
Disk Bead	19.26	7.25	4.83
Disk Bead	24.03	5.01	3.99
Disk Bead	18.75	6.46	4.12
Disk Bead	24.69	6.23	5.38
Disk Bead	13.55	3.58	3.39
Disk Bead	14.24	4.57	3.91
Disk Bead	14.44	7.52	5.24
Disk Bead	18.91	3.20	3.57
Disk Bead	16.94	2.91	2.83
Disk Bead	13.74	3.40	3.83
Disk Bead	13.35	5.95	3.99
Disk Bead	15.39	4.41	3.51
Disk Bead	12.41	3.51	4.29
Disk Bead	21.47	5.05	4.89
Disk Bead	30.58	4.14	4.66
Disk Bead	22.99	6.49	4.15
Disk Bead	18.37	4.28	3.48
Disk Bead	20.60	3.62	5.12
Disk Bead	13.36	5.12	5.12
Disk Bead	12.64	6.14	5.29

Disk Bead	13.21	4.16	3.54
Disk Bead	14.54	2.51	4.23
Disk Bead	12.60	4.80	3.41
Disk Bead	14.76	2.61	3.93
Disk Bead	16.16	3.77	4.92
Disk Bead	13.14	4.81	5.19
Disk Bead	11.19	3.39	3.48
Disk Bead	33.19	7.55	6.08
Disk Bead	14.30	5.68	5.69
Disk Bead	21.74	4.76	3.84
Disk Bead	18.25	2.94	5.14
Disk Bead	16.96	3.35	3.40
Disk Bead	15.39	4.09	4.37
Disk Bead	16.26	3.26	4.16
Disk Bead	15.54	3.24	2.92
Disk Bead	10.08	3.77	3.16
Disk Bead	17.03	2.49	4.21
Disk Bead	13.70	3.73	3.54
Disk Bead	15.94	3.44	4.34
Disk Bead	14.60	4.77	4.60
Disk Bead	20.26	6.39	4.39
Disk Bead	16.93	3.84	4.03
Disk Bead	14.38	3.82	4.35
Disk Bead	15.39	4.84	4.41
Disk Bead	9.81	3.37	3.55
Disk Bead	13.36	1.90	3.19
Disk Bead	18.95	5.78	4.91
Disk Bead	21.21	4.38	3.79
Disk Bead	14.58	7.48	4.16
Disk Bead	20.89	8.07	5.73
Disk Bead	16.44	10.85	6.48
Disk Bead	17.64	2.78	3.73
Disk Bead	18.14	8.74	4.47
Disk Bead	9.19	4.35	3.23
Disk Bead	16.42	3.31	3.10
Disk Bead	18.59	5.31	4.97
Disk Bead	18.94	3.53	4.43
Disk Bead	18.95	4.93	3.15
Disk Bead	14.28	2.86	4.73
Disk Bead	15.33	8.43	3.41
Disk Bead	18.39	4.22	4.39
Disk Bead	22.59	4.49	4.01
Disk Bead	13.07	2.64	3.33
Disk Bead	13.36	3.00	3.16
Disk Bead	11.37	4.09	4.29
Disk Bead	10.04	3.40	2.96

Disk Bead	23.75	7.74	4.17
Disk Bead	20.75	7.90	4.04
Disk Bead	8.08	4.97	3.49
Disk Bead	18.27	4.38	3.47
Disk Bead	14.81	3.09	3.46
Disk Bead	15.25	4.28	3.75
Disk Bead	13.45	5.11	3.75
Disk Bead	21.54	5.77	4.75
Disk Bead	19.04	5.56	4.07
Disk Bead	22.29	5.39	5.51
Disk Bead	20.68	4.49	5.72
Disk Bead	13.26	2.86	3.99
Disk Bead	16.54	5.93	6.07
Disk Bead	17.23	4.46	4.23
Disk Bead	13.26	4.34	4.39
Disk Bead	13.13	4.14	3.86
Disk Bead	8.55	5.35	4.24
Disk Bead	9.81	2.90	3.09
Disk Bead	15.79	3.09	4.15
Disk Bead	14.43	5.41	4.32
Disk Bead	13.19	6.87	3.99
Disk Bead	14.36	3.82	4.96
Disk Bead	13.29	3.94	3.42
Disk Bead	10.46	3.31	2.97
Disk Bead	22.41	7.02	5.58
Disk Bead	17.91	4.59	6.03
Disk Bead	12.58	6.13	3.59
Disk Bead	12.04	3.21	2.92
Disk Bead	10.61	2.62	3.24
Disk Bead	10.59	3.72	2.78
Disk Bead	10.35	6.38	4.53
Disk Bead	8.99	5.01	3.65
Disk Bead	26.51	5.99	5.18
Disk Bead	18.82	3.72	5.17
Disk Bead	16.05	5.39	6.36
Disk Bead	18.13	4.04	4.73
Disk Bead	16.94	5.30	4.99
Disk Bead	9.78	4.55	4.16
Disk Bead	16.68	7.26	4.19
Disk Bead	11.88	5.84	3.76
Disk Bead	16.89	4.96	3.66
Disk Bead	15.06	3.60	3.76
Disk Bead	22.63	2.32	3.23
Disk Bead	11.39	3.65	3.88
Disk Bead	20.30	3.51	4.19
Disk Bead	13.11	3.92	4.50

Disk Bead	13.03	3.69	3.26
Disk Bead	10.11	2.14	4.17
Disk Bead	13.53	4.84	4.35
Disk Bead	12.53	3.25	3.57
Disk Bead	12.20	1.85	3.11
Disk Bead	10.72	2.10	2.55
Disk Bead	16.21	6.16	4.57
Disk Bead	13.84	3.05	4.06
Disk Bead	18.87	6.32	3.41
Disk Bead	17.57	4.60	3.59
Disk Bead	16.06	4.03	5.00
Disk Bead	12.26	3.55	3.97
Disk Bead	18.54	3.67	3.81
Disk Bead	14.29	2.67	3.94
Disk Bead	11.25	4.61	3.30
Disk Bead	15.07	4.03	3.81
Disk Bead	13.28	4.66	4.33
Disk Bead	10.12	1.59	3.17
Disk Bead	17.86	3.68	3.33
Disk Bead	13.39	3.92	4.20
Disk Bead	14.05	4.92	4.11
Disk Bead	9.95	2.37	4.02
Disk Bead	17.62	5.57	3.79
Disk Bead	12.74	6.13	3.45
Disk Bead	10.14	4.14	5.01
Disk Bead	16.21	3.10	3.91
Disk Bead	14.63	12.71	4.02
Disk Bead	13.18	2.31	3.04
Disk Bead	12.83	3.37	3.15
Disk Bead	15.02	1.94	3.86
Disk Bead	14.00	2.45	3.25
Disk Bead	13.96	2.45	3.35
Disk Bead	12.43	4.02	3.17
Disk Bead	8.77	3.40	2.45
Disk Bead	13.22	2.53	3.49
Disk Bead	11.29	3.46	3.52
Disk Bead	10.09	2.95	2.96
Disk Bead	12.97	4.20	4.02
Disk Bead	14.11	2.77	3.27
Disk Bead	14.70	3.79	3.33
Disk Bead	6.47	3.71	2.72
Disk Bead	14.91	2.65	2.77
Disk Bead	12.46	4.92	4.66
Disk Bead	11.52	4.06	2.68
Disk Bead	12.60	3.65	3.15
Disk Bead	9.62	3.00	3.67

Disk Bead	9.33	3.16	4.25
Disk Bead	12.91	2.31	3.34
Disk Bead	10.19	2.63	2.51
Disk Bead	11.11	3.43	3.61
Disk Bead	9.59	2.42	2.80
Disk Bead	9.60	2.75	2.90
Disk Bead	9.07	3.62	3.22
Disk Bead	10.92	2.57	3.34
Disk Bead	8.50	3.57	3.03
Disk Bead	12.26	3.74	4.71
Disk Bead	11.79	3.54	4.22
Disk Bead	9.01	4.32	2.98
Disk Bead	11.12	3.21	2.64
Disk Bead	8.81	3.17	2.10
Disk Bead	8.42	2.62	3.42
Disk Bead	10.75	3.29	3.03
Disk Bead	11.51	3.48	2.47
Disk Bead	8.90	3.01	3.02
Disk Bead	12.21	3.66	3.95
Disk Bead	8.59	3.73	1.92
Disk Bead	9.69	2.15	2.94
Disk Bead	10.04	3.83	2.46
Disk Bead	8.96	3.09	3.27
Disk Bead	9.63	2.91	3.34
Disk Bead	19.50	4.24	4.14
Disk Bead	16.36	2.33	3.69
Disk Bead	12.80	2.66	3.06
Disk Bead	13.28	3.88	3.31
Disk Bead	17.40	2.97	3.40
Disk Bead	15.51	3.01	3.01
Disk Bead	16.78	4.10	3.71
Disk Bead	13.78	3.61	3.75
Disk Bead	17.68	3.83	3.63
Disk Bead	17.69	3.38	3.42
Disk Bead	9.13	3.39	3.20
Disk Bead	12.66	3.80	3.64
Disk Bead	12.37	4.94	5.48
Disk Bead	14.60	5.23	3.89
Disk Bead	8.72	3.48	3.26
Disk Bead	14.03	2.03	3.27
Disk Bead	8.17	2.79	3.05
Disk Bead	17.44	2.71	3.22
Disk Bead	10.44	3.38	3.69
Disk Bead	12.55	4.39	4.07
Disk Bead	21.24	5.45	5.05
Disk Bead	18.09	4.47	3.89

Disk Bead	21.39	7.74	4.69
Disk Bead	24.70	3.48	3.97
Disk Bead	13.18	4.83	4.58
Disk Bead	20.44	4.78	4.48
Disk Bead	13.36	3.66	3.59
Disk Bead	14.05	4.22	4.17
Disk Bead	15.29	5.63	3.70
Disk Bead	13.03	7.67	5.88
Disk Bead	14.50	2.58	3.08
Disk Bead	16.94	3.57	4.08
Disk Bead	17.85	2.96	4.12
Disk Bead	15.09	2.43	4.10
Disk Bead	13.18	3.20	3.34
Disk Bead	16.53	3.99	3.77
Disk Bead	12.98	2.33	4.10
Disk Bead	13.55	2.28	3.72
Disk Bead	16.23	4.31	3.82
Disk Bead	16.39	3.33	3.71
Disk Bead	10.04	3.61	4.05
Disk Bead	13.36	3.33	2.83
Disk Bead	9.66	2.93	2.77
Disk Bead	21.10	4.93	6.27
Disk Bead	12.75	6.67	5.33
Disk Bead	11.56	3.76	3.53
Disk Bead	16.47	1.64	3.30
Disk Bead	16.97	3.10	3.35
Disk Bead	16.45	5.13	4.66
Disk Bead	21.88	3.24	4.19
Disk Bead	13.96	3.82	4.05
Disk Bead	17.28	4.67	4.63
Disk Bead	17.69	3.43	3.07
Disk Bead	13.25	3.68	4.44
Disk Bead	14.56	4.84	5.23
Disk Bead	14.29	2.88	3.59
Disk Bead	9.81	3.33	3.41
Disk Bead	13.20	2.61	3.15
Disk Bead	10.10	4.25	2.82
Disk Bead	11.20	5.45	4.77
Disk Bead	10.88	1.91	4.16
Disk Bead	17.23	4.80	3.46
Disk Bead	11.78	2.42	4.31
Disk Bead	17.39	3.59	3.30
Disk Bead	18.68	3.16	4.33
Disk Bead	13.31	3.54	3.38
Disk Bead	15.60	4.22	4.99
Disk Bead	11.55	1.97	2.86

Disk Bead	9.42	3.27	3.31
Disk Bead	33.94	2.31	3.46
Disk Bead	24.03	3.33	5.02
Disk Bead	17.79	2.96	2.82
Disk Bead	16.55	3.62	3.99
Disk Bead	28.16	6.78	4.03
Disk Bead	23.49	4.92	4.80
Disk Bead	20.07	2.25	2.98
Disk Bead	16.74	2.99	4.20
Disk Bead	12.27	2.00	3.61
Disk Bead	18.15	2.67	4.74
Disk Bead	18.35	6.38	3.88
Disk Bead	15.96	7.73	4.72
Disk Bead	18.41	4.89	5.54
Disk Bead	21.53	8.46	4.92
Disk Bead	16.85	4.91	4.67
Disk Bead	14.43	2.17	3.71
Disk Bead	19.73	3.72	3.61
Disk Bead	12.18	6.00	5.05
Disk Bead	17.88	5.86	4.61
Disk Bead	17.89	6.08	4.95
Disk Bead	19.71	7.67	4.63
Disk Bead	20.27	3.75	4.73
Disk Bead	20.10	2.69	3.95
Disk Bead	13.70	3.69	4.36
Disk Bead	9.49	3.69	3.99
Disk Bead	16.67	6.45	4.18
Disk Bead	17.32	3.98	3.52
Disk Bead	12.84	3.41	4.66
Disk Bead	13.13	2.53	3.95
Disk Bead	12.60	2.27	4.18
Disk Bead	12.33	4.90	5.87
Disk Bead	10.38	5.71	3.87
Disk Bead	13.77	3.14	4.07
Disk Bead	18.13	3.47	4.57
Disk Bead	16.19	4.79	3.31
Disk Bead	18.22	2.50	3.37
Disk Bead	15.61	3.99	4.48
Disk Bead	17.21	6.01	4.98
Disk Bead	15.93	3.77	3.88
Disk Bead	15.78	4.11	5.17
Disk Bead	13.81	4.22	3.29
Disk Bead	11.17	5.51	3.96
Disk Bead	11.51	7.70	5.44
Disk Bead	13.52	3.58	4.13
Disk Bead	15.15	3.29	4.73

Disk Bead	13.80	6.28	3.63
Disk Bead	16.76	3.41	3.70
Disk Bead	12.56	3.45	3.81
Disk Bead	9.17	5.44	3.63
Disk Bead	8.86	5.13	4.12
Disk Bead	12.66	3.29	4.98
Disk Bead	13.02	2.68	3.70
Disk Bead	9.41	1.84	3.29
Disk Bead	13.55	3.36	4.41
Disk Bead	10.67	2.81	2.91
Disk Bead	10.11	2.11	3.09
Disk Bead	13.76	3.26	3.74
Disk Bead	8.80	3.02	3.39
Disk Bead	8.09	2.19	3.10
Disk Bead	19.13	4.69	3.86
Disk Bead	18.69	4.21	3.41
Disk Bead	20.86	4.98	4.01
Disk Bead	21.26	4.11	5.13
Disk Bead	16.46	3.26	3.50
Disk Bead	10.26	4.35	3.37
Disk Bead	15.68	2.37	3.83
Disk Bead	12.29	3.07	3.83
Disk Bead	14.00	3.88	3.74
Disk Bead	14.99	5.36	3.43
Disk Bead	10.55	2.37	3.13
Disk Bead	11.38	3.15	4.25
Disk Bead	15.26	5.90	3.95
Disk Bead	14.22	4.99	3.86
Disk Bead	11.71	4.10	3.88
Disk Bead	12.16	3.08	3.51
Disk Bead	12.80	4.79	3.54
Disk Bead	12.54	3.00	3.18
Disk Bead	11.49	4.24	4.01
Disk Bead	8.70	2.88	3.12
Disk Bead	10.34	3.03	3.68
Disk Bead	8.95	3.56	2.25
Disk Bead	11.27	2.64	3.79
Disk Bead	11.48	2.43	2.76
Disk Bead	16.96	4.48	3.69
Disk Bead	13.55	3.46	3.61
Disk Bead	25.59	8.04	5.83
Disk Bead	15.57	7.20	3.37
Disk Bead	16.34	6.99	5.76
Disk Bead	11.99	4.10	3.75
Disk Bead	15.54	5.27	4.06
Disk Bead	17.77	4.93	5.65

Disk Bead	14.99	2.56	3.23
Disk Bead	18.58	7.10	4.59
Disk Bead	13.93	3.94	3.73
Disk Bead	14.65	4.07	3.49
Disk Bead	12.60	1.96	2.43
Disk Bead	9.30	4.78	3.72
Disk Bead	9.42	2.28	3.16
Disk Bead	14.03	3.34	3.47
Disk Bead	14.54	2.17	2.94
Disk Bead	8.88	3.47	3.34
Disk Bead	9.34	3.09	3.34
Disk Bead	8.58	2.98	3.53
Disk Bead	10.61	3.10	3.34
Disk Bead	10.08	3.25	3.45
Disk Bead	14.14	3.90	4.33
Disk Bead	15.62	3.50	3.63
Disk Bead	22.66	7.57	6.01
Disk Bead	8.52	2.81	3.43
Disk Bead	16.78	4.36	4.68
Disk Bead	18.58	8.40	6.39
Disk Bead	16.97	4.20	6.41
Disk Bead	13.88	2.81	4.84
Disk Bead	12.77	3.15	3.52
Disk Bead	12.76	2.50	3.11
Disk Bead	14.23	2.29	3.14
Disk Bead	16.87	3.14	4.06
Disk Bead	9.51	3.20	3.87
Disk Bead	8.45	2.96	3.82
Disk Bead	12.26	2.73	2.67
Disk Bead	13.80	4.30	2.73
Disk Bead	14.43	3.36	4.33
Disk Bead	10.99	5.16	4.08
Disk Bead	13.30	3.22	3.58
Disk Bead	10.04	2.50	2.53
Disk Bead	8.52	3.42	4.14
Disk Bead	10.74	1.85	3.17
Disk Bead	9.48	1.68	3.42
Disk Bead	11.25	5.84	3.69
Disk Bead	13.98	2.49	3.42
Disk Bead	22.17	5.62	5.16
Disk Bead	19.52	9.94	5.88
Disk Bead	19.24	4.06	4.18
Disk Bead	14.21	4.96	3.96
Disk Bead	20.69	4.97	4.80
Disk Bead	16.81	6.10	3.82
Disk Bead	17.44	5.22	4.91

Disk Bead	14.43	1.65	2.41
Disk Bead	17.62	3.81	4.65
Disk Bead	13.04	5.66	4.65
Disk Bead	17.18	3.68	4.14
Disk Bead	14.34	3.39	4.56
Disk Bead	12.69	3.10	4.07
Disk Bead	13.05	2.46	3.36
Disk Bead	11.98	3.79	3.04
Disk Bead	12.86	2.00	3.14
Disk Bead	9.50	5.31	3.56
Disk Bead	15.65	3.35	3.69
Disk Bead	12.08	4.23	3.11
Disk Bead	12.94	3.67	3.93
Disk Bead	12.86	4.09	3.25
Disk Bead	9.23	2.92	3.60
Disk Bead	11.79	3.29	2.65
Disk Bead	13.72	5.19	5.55
Disk Bead	16.97	5.51	2.76
Disk Bead	13.10	5.92	4.31
Disk Bead	12.20	3.83	5.36
Disk Bead	17.01	7.70	4.13
Disk Bead	16.55	3.07	4.25
Disk Bead	10.72	5.05	3.66
Disk Bead	12.58	2.15	3.10
Disk Bead	12.66	2.51	3.46
Disk Bead	14.62	3.59	4.34
Disk Bead	15.72	3.29	3.49
Disk Bead	8.88	3.33	4.24
Disk Bead	11.92	3.54	3.72
Disk Bead	7.79	3.23	3.26
Disk Bead	9.11	2.63	3.83
Disk Bead	19.18	3.26	4.31
Disk Bead	29.88	6.49	4.10
Disk Bead	23.93	4.58	4.44
Disk Bead	21.02	2.31	3.98
Disk Bead	18.08	3.32	3.95
Disk Bead	16.53	5.12	4.94
Disk Bead	16.37	5.34	3.91
Disk Bead	13.14	4.10	3.81
Disk Bead	11.32	3.12	4.11
Disk Bead	17.83	3.68	4.63
Disk Bead	12.99	4.01	4.24
Disk Bead	17.17	3.56	5.18
Disk Bead	13.03	6.31	3.21
Disk Bead	12.10	2.72	3.38
Disk Bead	19.95	3.76	3.51

Disk Bead	17.48	3.61	3.59
Disk Bead	14.93	6.35	5.67
Disk Bead	17.66	4.38	4.79
Disk Bead	12.92	4.82	4.16
Disk Bead	12.06	3.34	3.42
Disk Bead	12.97	3.84	5.50
Disk Bead	13.71	4.50	5.21
Disk Bead	13.24	3.90	4.79
Disk Bead	12.11	2.88	4.14
Disk Bead	13.48	4.32	3.86
Disk Bead	12.94	3.70	3.27
Disk Bead	11.47	4.00	4.52
Disk Bead	8.33	3.20	3.72
Disk Bead	13.92	2.99	2.96
Disk Bead	12.48	2.30	3.70
Disk Bead	7.97	3.32	3.69
Disk Bead	18.30	4.67	4.28
Disk Bead	11.84	4.55	3.60
Disk Bead	19.40	3.86	6.19
Disk Bead	21.21	4.44	4.42
Disk Bead	17.51	2.80	4.03
Disk Bead	16.21	7.36	3.72
Disk Bead	14.52	4.07	3.79
Disk Bead	17.74	2.43	4.96
Disk Bead	14.85	3.42	3.92
Disk Bead	19.03	4.20	3.81
Disk Bead	15.50	6.11	5.99
Disk Bead	11.64	4.24	4.09
Disk Bead	15.46	2.21	3.58
Disk Bead	13.97	4.48	4.24
Disk Bead	12.22	2.84	3.09
Disk Bead	11.56	3.60	3.67
Disk Bead	15.79	3.50	4.27
Disk Bead	14.23	2.76	3.56
Disk Bead	13.86	5.78	5.90
Disk Bead	13.26	5.71	4.04
Disk Bead	9.36	2.53	4.03
Disk Bead	13.32	2.23	3.97
Disk Bead	17.81	4.02	4.39
Disk Bead	38.95	6.22	6.76
Disk Bead	19.28	4.33	5.16
Disk Bead	12.68	4.68	3.99
Disk Bead	22.09	2.79	3.90
Disk Bead	21.46	6.78	4.33
Disk Bead	17.61	4.54	3.40
Disk Bead	17.33	7.67	6.35

Disk Bead	13.11	3.46	3.31
Disk Bead	15.33	5.03	4.10
Disk Bead	17.54	5.58	5.76
Disk Bead	17.13	4.60	5.32
Disk Bead	13.16	2.49	4.47
Disk Bead	15.26	6.88	4.12
Disk Bead	12.86	2.77	3.26
Disk Bead	18.69	3.78	6.01
Disk Bead	17.00	3.26	3.95
Disk Bead	18.59	2.17	3.61
Disk Bead	18.60	3.32	5.88
Disk Bead	19.80	2.77	4.76
Disk Bead	23.14	7.25	4.66
Disk Bead	20.73	2.89	3.07
Disk Bead	16.43	7.40	4.48
Disk Bead	13.25	3.63	3.79
Disk Bead	15.96	2.63	4.68
Disk Bead	16.19	4.48	4.29
Disk Bead	11.38	5.29	4.27
Disk Bead	17.21	1.97	3.45
Disk Bead	11.55	4.12	4.76
Disk Bead	17.50	4.86	5.17
Disk Bead	17.97	3.62	3.97
Disk Bead	18.51	3.46	4.65
Disk Bead	16.16	4.65	4.43
Disk Bead	18.58	1.45	3.01
Disk Bead	12.47	3.73	3.96
Disk Bead	11.16	3.95	3.87
Disk Bead	12.13	3.91	4.72
Disk Bead	10.91	3.26	2.99
Disk Bead	9.86	3.60	3.15
Disk Bead	13.73	3.06	2.79
Disk Bead	12.26	3.85	3.32
Disk Bead	10.32	2.63	3.46
Disk Bead	10.80	3.41	3.31
Disk Bead	9.81	4.01	3.78
Disk Bead	9.72	3.21	3.98
Disk Bead	8.08	3.05	2.78
Disk Bead	8.56	3.44	3.20
Disk Bead	9.07	3.90	3.25
Disk Bead	30.68	9.77	5.08
Disk Bead	14.73	7.69	3.52
Disk Bead	11.02	6.74	3.74
Disk Bead	18.79	5.34	4.73
Disk Bead	16.27	6.12	4.02
Disk Bead	12.57	4.43	4.99

Disk Bead	15.74	6.52	4.21
Disk Bead	19.72	2.83	3.89
Disk Bead	11.42	3.34	3.21
Disk Bead	13.23	1.58	3.16
Disk Bead	14.36	2.77	2.92
Disk Bead	9.47	2.61	3.11
Disk Bead	16.81	3.50	3.88
Disk Bead	14.06	7.45	3.92
Disk Bead	15.73	9.64	4.73
Disk Bead	17.06	4.71	3.88
Disk Bead	13.43	2.76	3.37
Disk Bead	15.48	3.59	3.92
Disk Bead	13.84	3.05	2.95
Disk Bead	17.01	2.43	3.09
Disk Bead	12.21	3.36	4.30
Disk Bead	11.41	2.68	3.52
Disk Bead	10.47	3.96	2.95
Disk Bead	11.83	1.96	3.51
Disk Bead	11.63	2.92	3.73
Disk Bead	13.47	4.62	4.58
Disk Bead	11.53	2.27	3.07
Disk Bead	14.19	3.73	4.20
Disk Bead	7.24	3.13	3.15
Disk Bead	10.48	2.68	2.74
Disk Bead	9.96	2.60	3.26
Disk Bead	12.87	2.19	3.07
Disk Bead	10.39	1.95	2.41
Disk Bead	9.03	2.61	2.52
Disk Bead	9.13	2.20	2.54
Disk Bead	9.28	2.60	2.77
Disk Bead	9.06	2.64	3.27
Disk Bead	9.44	2.23	3.35
Disk Bead	8.51	2.28	3.22
Disk Bead	22.04	5.95	4.90
Disk Bead	16.49	4.52	3.98
Disk Bead	12.89	2.50	2.98
Disk Bead	19.33	3.45	4.38
Disk Bead	13.49	7.66	4.28
Disk Bead	17.74	3.97	4.11
Disk Bead	23.73	5.42	6.37
Disk Bead	14.12	3.38	4.46
Disk Bead	14.94	3.39	3.96
Disk Bead	13.44	6.28	3.60
Disk Bead	13.35	3.20	3.73
Disk Bead	12.26	2.91	4.02
Disk Bead	12.73	3.97	5.10

Disk Bead	11.71	3.48	3.14
Disk Bead	16.41	3.80	5.48
Disk Bead	9.85	6.61	3.21
Disk Bead	12.25	4.11	4.13
Disk Bead	9.96	3.55	3.09
Disk Bead	8.80	3.19	3.55
Disk Bead	9.22	3.12	3.04
Disk Bead	17.71	7.12	4.49
Disk Bead	17.89	1.85	3.02
Disk Bead	19.48	6.18	3.53
Disk Bead	17.35	4.47	3.79
Disk Bead	22.39	5.03	6.04
Disk Bead	17.84	5.16	4.62
Disk Bead	19.20	3.43	3.46
Disk Bead	10.07	3.57	2.83
Disk Bead	21.25	3.76	4.80
Disk Bead	19.37	8.44	4.74
Disk Bead	20.67	2.51	3.56
Disk Bead	14.59	4.81	5.00
Disk Bead	13.89	3.50	3.51
Disk Bead	17.02	2.95	4.19
Disk Bead	12.50	4.10	3.76
Disk Bead	13.26	2.50	3.15
Disk Bead	10.90	3.37	3.77
Disk Bead	10.95	4.16	2.66
Disk Bead	17.87	4.00	2.96
Disk Bead	22.27	2.87	3.11
Disk Bead	11.49	6.42	4.26
Disk Bead	22.54	6.03	4.12
Disk Bead	15.51	4.05	4.72
Disk Bead	18.13	5.40	3.18
Disk Bead	14.44	3.37	3.69
Disk Bead	13.65	3.32	3.00
Disk Bead	14.70	4.81	4.41
Disk Bead	13.67	4.05	2.93
Disk Bead	15.99	4.16	4.38
Disk Bead	13.08	3.81	3.43
Disk Bead	15.32	4.61	3.84
Disk Bead	12.48	2.37	2.48
Disk Bead	8.93	3.98	3.57
Disk Bead	8.49	3.17	2.89
Disk Bead	13.85	1.04	3.22
Disk Bead	10.96	2.59	4.02
Disk Bead	12.09	4.18	4.33
Disk Bead	9.98	2.74	3.48
Disk Bead	20.35	6.57	3.78

Disk Bead	23.13	2.61	3.78
Disk Bead	23.76	11.35	5.86
Disk Bead	14.78	6.56	3.28
Disk Bead	20.42	2.57	3.31
Disk Bead	12.97	3.29	2.43
Disk Bead	10.60	2.54	3.26
Disk Bead	16.25	4.30	3.60
Disk Bead	12.10	4.31	3.75
Disk Bead	17.12	2.99	3.07
Disk Bead	17.60	3.58	4.00
Disk Bead	13.75	4.27	4.33
Disk Bead	10.35	5.00	3.16
Disk Bead	13.17	2.95	2.27
Disk Bead	15.50	4.28	3.54
Disk Bead	13.47	4.04	4.59
Disk Bead	11.92	5.12	2.98
Disk Bead	11.44	3.49	3.33
Disk Bead	9.54	1.98	3.30
Disk Bead	17.90	3.59	3.60
Disk Bead	19.69	5.61	4.86
Disk Bead	17.19	4.14	5.57
Disk Bead	18.13	5.71	2.75
Disk Bead	16.93	1.92	2.77
Disk Bead	20.89	6.88	4.79
Disk Bead	18.11	2.11	3.89
Disk Bead	13.95	2.14	3.96
Disk Bead	15.48	4.10	3.91
Disk Bead	15.28	6.18	3.59
Disk Bead	12.64	5.09	3.31
Disk Bead	16.37	5.10	5.30
Disk Bead	12.92	2.90	5.11
Disk Bead	10.64	2.79	3.82
Disk Bead	9.04	4.12	3.57
Disk Bead	13.58	6.43	5.39
Disk Bead	14.63	2.78	4.07
Disk Bead	11.35	3.33	3.88
Disk Bead	15.48	3.10	2.96
Disk Bead	14.06	3.01	4.04
Disk Bead	10.15	5.55	4.22
Disk Bead	9.65	3.09	3.31
Disk Bead	9.84	2.62	3.27
Disk Bead	21.24	6.09	3.78
Disk Bead	11.66	4.71	4.24
Disk Bead	16.52	2.81	3.39
Disk Bead	13.74	2.69	3.79
Disk Bead	14.81	2.95	2.82

Disk Bead	14.90	2.98	4.25
Disk Bead	13.13	2.91	3.58
Disk Bead	20.94	6.04	5.37
Disk Bead	11.18	4.08	4.86
Disk Bead	10.33	5.45	3.72
Disk Bead	13.37	3.46	4.16
Disk Bead	12.57	2.09	3.45
Disk Bead	12.66	2.93	3.27
Disk Bead	15.22	2.88	4.13
Disk Bead	10.82	5.40	4.62
Disk Bead	16.20	4.00	4.74
Disk Bead	9.98	3.89	2.91
Disk Bead	12.19	2.50	3.42
Disk Bead	13.67	2.17	3.40
Disk Bead	10.89	4.75	3.66
Disk Bead	15.61	2.90	3.73
Disk Bead	9.64	3.03	3.76
Disk Bead	14.21	4.24	3.70
Disk Bead	16.24	4.01	3.68
Disk Bead	10.45	3.89	3.99
Disk Bead	13.92	2.54	2.53
Disk Bead	10.76	3.55	3.02
Disk Bead	10.44	2.30	3.17
Disk Bead	8.94	3.45	2.95
Disk Bead	17.65	7.57	3.40
Disk Bead	37.69	4.21	4.56
Disk Bead	15.45	5.33	4.52
Disk Bead	17.44	2.44	3.89
Disk Bead	17.96	4.51	3.90
Disk Bead	13.21	4.39	4.45
Disk Bead	18.57	3.94	2.98
Disk Bead	18.29	5.09	4.30
Disk Bead	19.72	6.38	5.27
Disk Bead	19.71	4.27	4.60
Disk Bead	13.18	6.70	3.35
Disk Bead	15.46	6.78	3.88
Disk Bead	16.02	3.07	4.04
Disk Bead	21.24	4.75	4.43
Disk Bead	17.06	3.08	3.38
Disk Bead	17.31	2.74	5.09
Disk Bead	14.19	1.94	3.71
Disk Bead	17.01	3.52	4.85
Disk Bead	13.01	1.99	4.17
Disk Bead	9.83	3.69	3.07
Disk Bead	12.42	3.83	3.60
Disk Bead	10.46	3.69	3.79

Disk Bead	10.22	3.59	3.52
Disk Bead	13.53	3.35	3.55
Disk Bead	11.34	4.57	2.92
Disk Bead	12.92	3.92	4.09
Disk Bead	13.93	3.82	3.58
Disk Bead	11.28	4.42	4.01
Disk Bead	17.23	7.27	4.57
Disk Bead	24.60	2.63	3.09
Disk Bead	16.95	6.89	3.87
Disk Bead	18.93	4.76	5.50
Disk Bead	15.54	7.17	4.31
Disk Bead	14.20	6.30	3.47
Disk Bead	11.13	3.49	3.98
Disk Bead	13.23	4.34	3.96
Disk Bead	14.33	4.85	3.62
Disk Bead	8.20	4.95	3.53
Disk Bead	11.55	3.01	4.95
Disk Bead	9.43	5.01	4.09
Disk Bead	9.02	4.30	3.40
Disk Bead	12.83	3.85	3.48
Disk Bead	8.79	2.27	3.18
Disk Bead	11.80	2.60	3.10
Disk Bead	9.15	2.74	2.49
Disk Bead	11.77	2.46	2.97
Disk Bead	9.16	2.41	3.66
Disk Bead	8.11	2.45	2.95
Disk Bead	11.34	3.15	3.37
Disk Bead	11.71	3.49	3.16
Disk Bead	14.01	2.41	3.50
Disk Bead	10.81	2.94	4.94
Disk Bead	8.31	1.93	2.73
Disk Bead	10.72	1.76	2.87
Disk Bead	20.67	4.36	5.50
Disk Bead	14.52	6.10	4.42
Disk Bead	11.15	2.95	4.27
Disk Bead	18.21	4.99	4.09
Disk Bead	13.89	4.58	5.15
Disk Bead	15.18	5.58	3.83
Disk Bead	10.08	3.77	6.10
Disk Bead	14.12	4.98	3.44
Disk Bead	17.70	3.48	4.46
Disk Bead	12.02	2.45	3.32
Disk Bead	10.17	3.34	4.02
Disk Bead	10.09	3.81	3.77
Disk Bead	9.83	4.97	3.16
Disk Bead	14.77	4.10	2.66

Disk Bead	14.63	4.18	3.79
Disk Bead	12.31	4.31	4.05
Disk Bead	9.77	2.31	3.70
Disk Bead	9.99	3.32	3.25
Disk Bead	13.60	3.44	3.91
Disk Bead	11.72	1.81	2.94
Disk Bead	13.24	3.40	3.08
Disk Bead	9.97	2.75	3.81
Disk Bead	9.68	4.00	4.13
Disk Bead	32.79	8.96	4.41
Disk Bead	26.41	11.94	3.97
Disk Bead	23.06	2.90	3.16
Disk Bead	24.11	5.36	4.19
Disk Bead	16.21	4.36	3.31
Disk Bead	16.73	4.26	4.94
Disk Bead	15.59	5.78	4.06
Disk Bead	19.01	9.68	4.78
Disk Bead	17.70	3.90	3.98
Disk Bead	13.08	3.23	3.26
Disk Bead	11.05	3.44	3.03
Disk Bead	18.17	5.44	4.87
Disk Bead	15.39	6.98	3.39
Disk Bead	16.32	5.55	4.12
Disk Bead	17.83	3.67	3.67
Disk Bead	11.77	3.51	3.95
Disk Bead	14.50	5.63	4.25
Disk Bead	11.89	2.46	3.19
Disk Bead	14.04	5.94	7.62
Disk Bead	10.21	4.43	2.88
Disk Bead	10.05	3.23	3.25
Disk Bead	12.69	5.62	3.50
Disk Bead	13.14	2.94	3.94
Disk Bead	21.92	9.67	4.59
Disk Bead	17.48	3.92	3.27
Disk Bead	13.68	2.75	3.02
Disk Bead	22.81	5.09	4.18
Disk Bead	15.57	3.19	3.74
Disk Bead	25.05	3.83	3.88
Disk Bead	12.49	4.87	4.23
Disk Bead	17.33	5.04	5.34
Disk Bead	13.49	4.68	5.03
Disk Bead	12.37	6.38	5.24
Disk Bead	13.30	1.89	3.21
Disk Bead	12.70	1.99	3.63
Disk Bead	15.04	3.27	2.97
Disk Bead	15.06	5.75	3.82

Disk Bead	15.08	3.34	3.38
Disk Bead	12.85	4.15	4.09
Disk Bead	15.45	4.27	4.07
Disk Bead	13.85	3.95	3.54
Disk Bead	14.88	3.45	3.62
Disk Bead	12.37	3.94	3.01
Disk Bead	14.81	5.82	6.16
Disk Bead	15.44	2.94	3.06
Disk Bead	13.19	3.56	3.64
Disk Bead	12.63	2.67	3.59
Disk Bead	13.07	3.49	3.35
Disk Bead	9.29	4.97	3.51
Disk Bead	10.72	2.58	3.47
Disk Bead	10.24	3.21	3.83
Disk Bead	9.55	4.17	3.94
Disk Bead	10.70	2.72	2.38
Disk Bead	10.52	5.18	3.13
Disk Bead	9.73	5.03	3.15
Disk Bead	9.06	3.65	3.55
Disk Bead	12.03	3.18	3.40
Disk Bead	10.00	2.89	4.26
Disk Bead	22.16	8.58	5.08
Disk Bead	16.44	5.14	3.93
Disk Bead	16.38	4.24	4.64
Disk Bead	19.34	5.89	4.54
Disk Bead	16.19	5.76	5.11
Disk Bead	21.74	5.30	4.08
Disk Bead	17.91	3.77	4.05
Disk Bead	22.19	5.59	4.87
Disk Bead	12.89	6.39	4.34
Disk Bead	17.39	7.74	4.43
Disk Bead	23.04	5.22	3.41
Disk Bead	13.18	7.77	4.71
Disk Bead	18.01	2.76	3.43
Disk Bead	17.43	9.24	4.22
Disk Bead	13.62	6.59	4.86
Disk Bead	17.10	4.33	4.50
Disk Bead	12.03	5.02	3.80
Disk Bead	9.90	5.35	3.74
Disk Bead	13.81	2.90	3.63
Disk Bead	16.95	4.27	3.78
Disk Bead	11.74	4.60	3.40
Disk Bead	15.77	2.89	4.61
Disk Bead	11.37	4.70	3.27
Disk Bead	14.44	2.30	3.22
Disk Bead	10.97	3.68	3.39

Disk Bead	13.29	2.73	3.92
Disk Bead	12.66	2.74	3.52
Disk Bead	10.77	2.83	2.69
Disk Bead	23.25	2.00	3.25
Disk Bead	25.85	3.43	3.58
Disk Bead	12.05	4.91	3.41
Disk Bead	14.03	6.08	2.85
Disk Bead	19.28	5.36	3.68
Disk Bead	15.75	4.80	3.59
Disk Bead	20.41	3.41	3.55
Disk Bead	17.97	3.95	3.65
Disk Bead	13.38	3.61	3.75
Disk Bead	15.84	4.66	3.82
Disk Bead	13.91	2.78	3.39
Disk Bead	14.85	2.73	4.58
Disk Bead	12.76	3.78	5.11
Disk Bead	10.90	3.72	3.87
Disk Bead	13.48	4.78	5.63
Disk Bead	11.99	4.55	4.00
Disk Bead	12.47	3.89	3.31
Disk Bead	11.27	3.82	3.07
Disk Bead	9.53	1.54	3.61
Disk Bead	11.02	3.16	2.26
Disk Bead	10.39	2.99	3.68
Disk Bead	10.88	4.07	3.29
Disk Bead	18.04	6.21	3.99
Disk Bead	22.05	7.41	3.77
Disk Bead	15.14	4.63	3.40
Disk Bead	17.61	3.98	4.40
Disk Bead	16.97	4.98	3.76
Disk Bead	9.32	4.04	3.34
Disk Bead	20.36	4.83	4.09
Disk Bead	16.87	4.55	2.95
Disk Bead	15.01	2.33	2.94
Disk Bead	16.13	3.41	3.64
Disk Bead	13.43	3.32	3.01
Disk Bead	16.90	2.67	3.41
Disk Bead	14.41	3.23	2.99
Disk Bead	13.28	3.21	4.02
Disk Bead	12.90	5.44	4.33
Disk Bead	16.03	3.64	3.59
Disk Bead	11.32	3.08	4.18
Disk Bead	10.29	2.46	3.60
Disk Bead	10.43	4.09	3.68
Disk Bead	13.40	2.47	2.77
Disk Bead	21.75	3.01	3.14

Disk Bead	17.51	6.39	4.95
Disk Bead	22.24	5.91	3.77
Disk Bead	20.50	4.05	4.45
Disk Bead	11.14	5.00	5.25
Disk Bead	19.38	5.17	6.10
Disk Bead	17.69	4.76	4.47
Disk Bead	18.17	4.01	4.60
Disk Bead	15.97	7.45	3.95
Disk Bead	18.45	4.70	3.51
Disk Bead	16.63	3.56	2.97
Disk Bead	17.42	2.96	3.40
Disk Bead	13.01	3.73	2.70
Disk Bead	13.94	3.44	3.82
Disk Bead	10.75	2.77	3.41
Disk Bead	13.31	4.47	5.10
Disk Bead	13.56	4.82	4.42
Disk Bead	10.26	2.68	3.08
Disk Bead	11.96	4.41	4.20
Disk Bead	8.93	4.59	3.00
Disk Bead	11.86	3.23	2.73
Disk Bead	9.71	4.24	3.14
Disk Bead	12.19	3.60	4.78
Disk Bead	10.98	4.14	5.31
Disk Bead	11.50	3.40	3.22
Disk Bead	11.85	1.70	3.34
Disk Bead	10.22	4.24	3.35
Disk Bead	21.45	6.58	8.21
AVERAGES (mm)	**14.88**	**4.20**	**3.95**

Broken or incomplete beads were not measured and are not included in these size averages
Total beads 1220

Table A.5 Wislon Mound Bundle #27 Disk Beads

Artifact Type	Length (mm)	Thickness (mm)	Drill Hole Diameter (mm)
Disk Bead	26.03	3.23	5.36
Disk Bead	20.10	5.92	5.25
Disk Bead	13.02	3.41	3.33
Disk Bead	16.46	2.46	3.78
Disk Bead	15.24	6.27	4.85
Disk Bead	13.47	3.80	4.08
Disk Bead	9.99	2.95	4.35
Disk Bead	17.62	2.44	3.29
Disk Bead	13.69	5.31	3.55
Disk Bead	10.41	4.65	4.29
Disk Bead	17.52	4.71	5.41
Disk Bead	14.16	3.50	4.78
Disk Bead	12.58	3.11	5.26
Disk Bead	11.59	4.99	4.86
Disk Bead	12.05	4.97	4.89
Disk Bead	13.05	2.77	3.39
Disk Bead	10.80	1.94	2.76
Disk Bead	9.49	2.64	2.99
Disk Bead	10.75	2.74	3.18
Disk Bead	13.57	4.19	5.17
Disk Bead	28.48	3.18	4.60
Disk Bead	17.30	4.80	4.80
Disk Bead	23.43	6.21	5.46
Disk Bead	13.29	3.86	3.88
Disk Bead	17.29	4.34	4.54
Disk Bead	17.01	4.01	4.21
Disk Bead	13.96	5.62	9.55
Disk Bead	12.52	3.56	2.98
Disk Bead	19.66	5.98	5.52
Disk Bead	15.30	4.51	5.18
Disk Bead	10.93	3.61	4.43
Disk Bead	9.94	4.93	4.46
Disk Bead	8.28	3.00	3.19
Disk Bead	21.30	6.06	4.69
Disk Bead	14.30	4.71	6.35
Disk Bead	21.95	9.68	9.59
Disk Bead	20.98	4.91	3.99
Disk Bead	13.28	4.82	3.81
Disk Bead	20.68	6.14	4.65
Disk Bead	12.09	7.12	4.14
Disk Bead	11.90	5.32	5.46
Disk Bead	16.32	3.57	3.84
Disk Bead	20.15	3.08	3.79
Disk Bead	11.12	3.45	3.34

Disk Bead	14.48	4.19	4.23
Disk Bead	13.20	2.91	3.33
Disk Bead	13.12	4.66	3.77
Disk Bead	15.04	3.60	3.89
Disk Bead	10.41	2.14	3.89
Disk Bead	16.46	2.99	4.81
Disk Bead	17.67	8.61	4.96
Disk Bead	17.81	2.81	4.27
Disk Bead	13.53	5.78	4.69
Disk Bead	19.50	4.70	4.15
Disk Bead	16.20	4.82	3.63
Disk Bead	15.42	4.91	3.22
Disk Bead	16.58	2.98	3.56
Disk Bead	15.18	6.24	2.97
Disk Bead	19.05	4.30	5.32
Disk Bead	13.66	3.49	4.77
Disk Bead	16.95	5.07	3.65
Disk Bead	17.27	1.75	2.95
Disk Bead	12.06	4.28	3.75
Disk Bead	12.27	3.81	4.06
Disk Bead	10.27	4.14	3.12
Disk Bead	10.57	4.81	4.09
Disk Bead	10.04	4.91	3.45
Disk Bead	12.97	3.48	2.88
Disk Bead	12.37	3.00	3.77
Disk Bead	13.19	4.19	3.20
Disk Bead	9.98	3.74	3.36
Disk Bead	12.13	2.88	3.52
Disk Bead	11.81	4.70	3.54
Disk Bead	11.33	2.71	3.62
Disk Bead	10.25	4.22	3.16
Disk Bead	10.27	4.88	4.19
Disk Bead	9.89	4.85	3.42
Disk Bead	14.10	4.70	4.36
Disk Bead	10.81	2.71	2.75
Disk Bead	10.82	2.76	3.03
Disk Bead	20.84	4.12	4.31
Disk Bead	18.82	8.86	6.13
Disk Bead	16.72	5.09	4.65
Disk Bead	14.51	5.99	3.68
Disk Bead	15.86	4.66	3.35
Disk Bead	21.00	4.78	5.01
Disk Bead	16.63	4.28	4.07
Disk Bead	14.43	4.62	4.88
Disk Bead	22.56	2.68	3.83
Disk Bead	14.91	3.38	3.97

Disk Bead	12.37	5.28	4.77
Disk Bead	15.52	3.18	3.82
Disk Bead	11.78	2.43	3.29
Disk Bead	11.91	3.28	3.26
Disk Bead	11.88	3.06	4.45
Disk Bead	18.79	4.65	5.28
Disk Bead	15.51	2.82	3.45
Disk Bead	11.83	2.08	3.32
Disk Bead	11.48	4.09	4.23
Disk Bead	13.12	4.87	4.02
Disk Bead	22.92	6.37	5.06
Disk Bead	16.79	3.22	4.90
Disk Bead	20.71	5.22	4.70
Disk Bead	21.11	3.08	3.99
Disk Bead	18.46	8.76	5.81
Disk Bead	17.50	4.27	4.16
Disk Bead	16.36	5.14	5.79
Disk Bead	14.44	2.76	3.79
Disk Bead	20.00	2.72	3.63
Disk Bead	19.07	3.73	3.34
Disk Bead	13.83	5.93	3.68
Disk Bead	14.47	2.04	3.04
Disk Bead	14.57	5.26	3.97
Disk Bead	13.87	3.09	3.45
Disk Bead	12.11	3.18	3.19
Disk Bead	23.98	5.59	4.16
Disk Bead	17.63	3.88	4.36
Disk Bead	15.29	8.65	3.33
Disk Bead	14.13	4.46	4.81
Disk Bead	17.74	5.05	5.50
Disk Bead	19.15	3.78	3.72
Disk Bead	13.88	1.83	2.44
Disk Bead	16.60	3.39	4.46
Disk Bead	14.85	6.15	4.08
Disk Bead	11.94	4.33	3.59
Disk Bead	9.54	2.86	2.83
Disk Bead	22.59	4.50	3.81
Disk Bead	15.88	3.76	3.94
Disk Bead	14.64	2.36	3.11
Disk Bead	14.70	5.11	3.78
Disk Bead	13.87	8.05	3.00
Disk Bead	13.39	2.90	3.78
Disk Bead	19.92	6.86	4.13
Disk Bead	16.12	2.52	3.32
Disk Bead	15.99	3.88	4.90
Disk Bead	11.47	3.26	4.16

Disk Bead	12.10	5.66	5.15
Disk Bead	12.35	2.65	3.57
Disk Bead	15.56	3.57	5.52
Disk Bead	13.39	6.61	4.85
Disk Bead	10.64	3.63	3.54
Disk Bead	20.65	3.75	3.67
Disk Bead	17.91	4.49	4.25
Disk Bead	18.19	4.82	4.15
Disk Bead	15.79	3.72	3.10
Disk Bead	16.80	3.29	4.98
Disk Bead	12.57	4.18	4.33
Disk Bead	11.78	4.26	3.01
Disk Bead	21.17	1.80	4.10
Disk Bead	11.45	5.23	4.51
Disk Bead	12.99	2.60	4.18
Disk Bead	10.87	3.55	3.79
Disk Bead	12.19	4.35	3.08
Disk Bead	27.46	4.66	4.61
Disk Bead	17.94	5.46	4.55
Disk Bead	16.86	4.64	3.19
Disk Bead	18.87	3.49	4.32
Disk Bead	13.94	3.74	4.41
Disk Bead	23.10	7.53	4.93
Disk Bead	20.51	2.83	2.46
Disk Bead	4.38	4.31	4.20
Disk Bead	13.51	6.20	5.80
Disk Bead	14.55	9.02	3.89
Disk Bead	15.68	5.85	5.31
Disk Bead	10.57	6.65	4.13
Disk Bead	13.78	4.99	4.85
Disk Bead	13.15	4.52	3.76
Disk Bead	11.76	4.28	2.64
Disk Bead	13.98	2.55	3.55
Disk Bead	15.51	4.90	5.37
Disk Bead	13.97	4.20	3.01
Disk Bead	12.47	5.74	4.74
Disk Bead	12.48	6.69	4.18
Disk Bead	10.43	2.97	2.94
Disk Bead	9.85	3.91	3.28
Disk Bead	33.65	6.26	4.36
Disk Bead	23.97	6.01	3.77
Disk Bead	22.53	6.08	5.15
Disk Bead	19.57	10.41	3.88
Disk Bead	24.98	4.82	3.68
Disk Bead	19.19	5.11	3.96
Disk Bead	13.68	2.96	3.22

Disk Bead	10.80	6.33	4.31
Disk Bead	16.54	5.76	4.79
Disk Bead	12.59	3.43	3.59
Disk Bead	9.60	3.65	2.57
Disk Bead	14.81	3.63	3.15
Disk Bead	14.50	4.60	3.21
Disk Bead	14.46	5.12	3.07
Disk Bead	21.00	6.72	4.39
Disk Bead	15.62	2.18	3.81
Disk Bead	13.16	7.13	3.96
Disk Bead	18.26	3.58	3.84
Disk Bead	12.88	4.81	3.26
Disk Bead	16.75	6.83	4.63
Disk Bead	17.12	5.81	2.87
Disk Bead	21.06	3.92	3.52
Disk Bead	18.79	5.68	3.85
Disk Bead	14.86	3.13	2.61
Disk Bead	11.20	6.13	3.96
Disk Bead	15.67	4.12	4.70
Disk Bead	16.03	3.05	3.83
Disk Bead	11.84	3.75	4.12
Disk Bead	12.92	3.04	3.22
Disk Bead	13.16	3.68	3.06
Disk Bead	10.66	2.83	3.59
Disk Bead	25.06	5.53	4.74
Disk Bead	17.31	2.91	3.71
Disk Bead	22.02	8.13	4.37
Disk Bead	14.58	3.96	3.70
Disk Bead	19.11	5.82	4.30
Disk Bead	15.96	4.73	3.64
Disk Bead	12.34	5.42	2.98
Disk Bead	18.57	2.59	2.86
Disk Bead	13.72	4.93	3.74
Disk Bead	15.91	6.15	5.26
Disk Bead	17.10	7.16	4.16
Disk Bead	15.08	5.02	5.55
Disk Bead	13.04	3.88	3.59
Disk Bead	12.20	4.39	3.76
Disk Bead	15.01	6.96	4.18
Disk Bead	10.92	3.37	2.81
Disk Bead	8.45	4.42	3.94
Disk Bead	10.29	4.21	4.09
Disk Bead	10.39	4.09	3.16
Disk Bead	11.23	2.73	3.28
Disk Bead	11.67	3.65	3.42
Disk Bead	12.26	3.47	3.21

Disk Bead	18.53	5.04	3.36
Disk Bead	17.11	3.78	3.30
Disk Bead	10.69	4.04	3.58
Disk Bead	12.44	4.43	4.01
Disk Bead	12.68	5.59	3.15
Disk Bead	14.06	2.75	2.85
Disk Bead	10.37	3.94	3.56
Disk Bead	13.67	3.80	3.78
Disk Bead	10.25	3.82	3.52
Disk Bead	14.42	5.03	4.52
Disk Bead	10.12	3.73	3.63
Disk Bead	11.18	3.63	3.39
Disk Bead	14.90	3.22	2.44
Disk Bead	11.82	4.88	3.76
Disk Bead	11.43	3.79	3.79
Disk Bead	15.23	3.96	3.86
Disk Bead	12.54	4.55	3.20
Disk Bead	13.98	5.04	3.06
Disk Bead	13.02	3.32	3.12
Disk Bead	10.52	3.57	3.66
Disk Bead	15.37	3.09	4.29
Disk Bead	10.54	5.25	3.83
Disk Bead	14.44	2.30	3.27
Disk Bead	10.21	3.33	3.33
Disk Bead	12.79	3.01	2.39
Disk Bead	11.07	3.50	2.74
Disk Bead	12.29	2.28	2.73
Disk Bead	18.56	4.85	3.84
Disk Bead	14.61	3.09	2.83
Disk Bead	16.99	6.84	4.33
Disk Bead	23.77	3.51	3.79
Disk Bead	13.23	6.92	4.38
Disk Bead	14.95	2.80	2.60
Disk Bead	16.66	4.09	3.84
Disk Bead	9.48	4.99	3.86
Disk Bead	13.43	6.47	5.13
Disk Bead	15.11	3.09	3.25
Disk Bead	15.63	3.03	3.16
Disk Bead	12.70	3.40	3.57
Disk Bead	11.69	4.69	3.52
Disk Bead	12.00	4.24	3.05
Disk Bead	13.71	4.22	3.61
Disk Bead	9.49	5.40	3.91
Disk Bead	13.42	4.44	2.48
Disk Bead	12.59	2.70	2.66
Disk Bead	13.16	3.84	3.32

Disk Bead	11.10	2.53	3.85
Disk Bead	11.53	2.33	3.11
Disk Bead	21.69	7.01	5.79
Disk Bead	23.91	4.46	5.39
Disk Bead	25.18	5.04	4.85
Disk Bead	26.29	7.48	4.69
Disk Bead	15.12	4.03	4.64
Disk Bead	12.63	3.35	3.49
Disk Bead	16.04	2.88	3.08
Disk Bead	13.22	5.55	5.09
Disk Bead	18.02	3.65	3.75
Disk Bead	15.60	4.47	3.01
Disk Bead	16.19	3.24	4.34
Disk Bead	15.23	4.44	3.73
Disk Bead	15.91	5.67	4.83
Disk Bead	12.30	5.05	2.64
Disk Bead	10.91	3.57	3.92
Disk Bead	22.31	11.93	5.35
Disk Bead	26.39	8.67	4.18
Disk Bead	22.58	6.15	4.10
Disk Bead	19.38	5.20	3.28
Disk Bead	12.06	6.21	4.12
Disk Bead	10.95	4.86	3.49
Disk Bead	15.97	5.54	4.36
Disk Bead	11.44	4.48	3.64
Disk Bead	15.91	3.04	4.36
Disk Bead	16.60	6.49	4.49
Disk Bead	17.87	5.14	3.70
Disk Bead	17.37	4.67	3.67
Disk Bead	12.83	7.05	4.23
Disk Bead	8.96	2.62	3.40
Disk Bead	23.80	4.60	4.65
Disk Bead	22.33	4.32	3.51
Disk Bead	17.29	6.30	5.36
Disk Bead	15.07	3.46	2.86
Disk Bead	14.15	7.03	4.45
Disk Bead	20.95	4.12	4.41
Disk Bead	21.61	5.26	4.85
Disk Bead	24.53	5.13	4.09
Disk Bead	25.60	8.53	5.71
Disk Bead	20.12	5.08	4.67
Disk Bead	20.78	4.87	4.68
Disk Bead	26.79	12.09	4.63
Disk Bead	22.14	4.17	3.58
Disk Bead	19.36	2.39	3.84
Disk Bead	23.70	2.78	3.81

Disk Bead	14.66	7.15	7.29
Disk Bead	13.78	5.21	3.01
Disk Bead	13.87	2.90	3.71
Disk Bead	17.12	6.10	4.07
Disk Bead	18.03	3.19	4.38
Disk Bead	12.58	4.48	3.20
Disk Bead	16.68	3.64	3.19
Disk Bead	13.82	5.05	4.07
Disk Bead	17.72	2.54	2.41
Disk Bead	12.74	3.57	3.15
Disk Bead	43.64	14.11	4.59
Disk Bead	19.03	4.30	3.71
Disk Bead	12.65	6.09	3.01
Disk Bead	16.48	3.68	3.08
Disk Bead	13.71	3.94	3.89
Disk Bead	11.95	5.15	4.55
Disk Bead	15.30	8.73	5.06
Disk Bead	11.83	5.11	3.37
Disk Bead	17.24	7.08	4.26
Disk Bead	21.52	2.85	3.62
Disk Bead	20.93	7.04	5.37
Disk Bead	15.82	4.05	4.51
Disk Bead	18.67	4.44	4.22
Disk Bead	17.09	6.59	5.03
Disk Bead	14.71	4.10	4.02
Disk Bead	16.13	2.96	3.41
Disk Bead	13.80	4.61	4.43
Disk Bead	9.95	4.21	4.82
Disk Bead	13.11	5.88	3.83
Disk Bead	14.21	5.58	4.41
Disk Bead	9.56	4.80	5.31
Disk Bead	9.72	2.96	4.03
Disk Bead	9.73	4.19	3.29
Disk Bead	10.15	4.93	4.49
Disk Bead	10.19	3.11	4.01
Disk Bead	12.10	3.85	3.40
Disk Bead	15.95	7.25	5.50
Disk Bead	27.96	8.82	4.71
Disk Bead	19.57	9.20	5.93
Disk Bead	14.03	4.63	3.23
Disk Bead	17.27	4.54	3.68
Disk Bead	16.44	3.01	3.00
Disk Bead	25.51	3.21	2.63
Disk Bead	23.10	4.34	2.87
Disk Bead	26.48	4.13	4.20
Disk Bead	18.28	5.09	5.40

Disk Bead	16.05	6.95	3.65
Disk Bead	13.90	3.75	3.74
Disk Bead	13.43	3.28	4.72
Disk Bead	18.44	2.26	3.83
Disk Bead	12.40	2.63	3.12
Disk Bead	19.27	8.87	4.89
Disk Bead	20.76	4.42	4.80
Disk Bead	12.18	2.91	4.09
Disk Bead	15.02	5.70	4.04
Disk Bead	16.99	7.36	5.63
Disk Bead	15.33	4.21	4.26
Disk Bead	9.86	4.99	3.41
Disk Bead	11.07	2.99	4.08
Disk Bead	33.21	3.73	4.56
Disk Bead	20.00	7.94	4.58
Disk Bead	23.66	3.51	4.95
Disk Bead	17.19	4.39	6.28
Disk Bead	13.87	7.95	5.04
Disk Bead	12.36	4.13	4.98
Disk Bead	18.09	4.24	3.51
Disk Bead	11.92	3.24	4.01
Disk Bead	10.17	3.14	2.84
Disk Bead	13.47	4.27	4.83
Disk Bead	12.59	2.67	2.85
Disk Bead	19.40	3.78	3.86
Disk Bead	16.94	2.75	3.57
Disk Bead	16.78	2.85	3.26
Disk Bead	21.79	4.69	3.38
Disk Bead	12.82	3.63	3.76
Disk Bead	20.27	4.08	5.21
Disk Bead	12.42	3.56	5.02
Disk Bead	11.19	4.05	2.92
Disk Bead	13.32	4.63	3.57
Disk Bead	10.70	3.54	3.41
Disk Bead	16.55	3.99	3.13
Disk Bead	15.05	5.96	3.86
Disk Bead	12.94	2.86	4.25
Disk Bead	13.01	3.05	3.19
Disk Bead	8.29	4.71	3.77
Disk Bead	10.33	4.50	4.54
Disk Bead	11.86	3.24	2.97
Disk Bead	12.48	2.09	2.32
Disk Bead	12.05	2.73	3.29
Disk Bead	10.60	2.63	3.74
Disk Bead	10.72	3.93	2.91
Disk Bead	22.30	3.29	3.17

Disk Bead	13.42	3.10	3.31
Disk Bead	13.15	5.54	4.52
Disk Bead	14.75	4.80	4.05
Disk Bead	15.36	4.93	4.12
Disk Bead	17.54	3.97	3.82
Disk Bead	15.65	2.90	4.05
Disk Bead	13.68	5.11	3.50
Disk Bead	16.64	9.60	3.60
Disk Bead	16.82	5.63	3.47
Disk Bead	20.44	4.89	4.58
Disk Bead	13.89	5.33	5.09
Disk Bead	15.50	2.97	3.40
Disk Bead	18.55	3.57	3.63
Disk Bead	16.07	3.91	4.11
Disk Bead	14.29	4.96	4.30
Disk Bead	16.46	4.75	4.27
Disk Bead	16.26	3.96	3.05
Disk Bead	11.53	3.42	3.26
Disk Bead	13.11	3.47	2.21
Disk Bead	9.91	3.86	3.18
Disk Bead	11.37	3.19	3.82
Disk Bead	13.49	2.95	4.25
Disk Bead	12.82	3.09	3.59
Disk Bead	13.88	2.21	3.45
Disk Bead	25.44	3.18	4.23
Disk Bead	15.42	4.68	4.73
Disk Bead	13.32	4.75	3.68
Disk Bead	17.89	3.23	3.96
Disk Bead	18.79	4.63	3.82
Disk Bead	15.49	2.32	2.67
Disk Bead	12.66	3.51	5.36
Disk Bead	24.60	4.90	3.26
Disk Bead	26.37	3.60	4.51
Disk Bead	35.49	5.84	8.08
Disk Bead	13.55	4.28	3.77
Disk Bead	21.79	2.27	2.82
Disk Bead	17.05	3.53	4.41
Disk Bead	16.97	3.50	3.43
Disk Bead	11.09	2.71	3.70
Disk Bead	14.20	2.85	4.51
Disk Bead	15.51	8.74	3.61
Disk Bead	27.87	4.19	3.81
Disk Bead	17.82	4.28	4.38
Disk Bead	17.93	4.56	4.25
Disk Bead	15.19	3.46	4.21
Disk Bead	14.89	2.66	3.79

Disk Bead	13.08	3.97	4.11
Disk Bead	15.64	5.76	4.33
Disk Bead	21.94	3.86	6.29
Disk Bead	15.47	7.54	4.97
Disk Bead	18.96	4.53	6.02
Disk Bead	10.39	5.62	3.43
Disk Bead	13.91	4.75	4.90
Disk Bead	15.63	5.27	4.05
Disk Bead	13.98	3.59	2.98
Disk Bead	12.99	4.05	4.59
Disk Bead	13.93	4.49	3.52
Disk Bead	13.39	4.62	4.53
Disk Bead	14.53	3.87	3.21
Disk Bead	11.84	3.79	3.42
Disk Bead	22.67	3.89	3.44
Disk Bead	15.89	4.89	5.36
Disk Bead	18.48	3.48	7.31
Disk Bead	17.19	3.29	3.33
Disk Bead	21.23	3.06	3.59
Disk Bead	24.77	5.75	3.36
Disk Bead	14.01	6.02	4.97
Disk Bead	24.55	4.66	4.43
Disk Bead	18.01	3.00	4.04
Disk Bead	17.67	3.03	3.28
Disk Bead	13.62	4.03	3.05
Disk Bead	14.97	3.69	5.46
Disk Bead	10.47	4.69	3.13
Disk Bead	19.27	5.26	4.85
Disk Bead	15.94	4.13	4.15
Disk Bead	15.86	3.26	3.19
Disk Bead	12.28	4.37	4.19
Disk Bead	14.29	3.77	2.97
Disk Bead	14.84	4.15	3.72
Disk Bead	24.56	4.88	5.24
Disk Bead	23.07	3.20	3.94
Disk Bead	15.03	4.53	3.57
Disk Bead	14.22	4.66	4.06
Disk Bead	14.20	5.39	4.53
Disk Bead	23.27	5.20	6.48
Disk Bead	21.95	8.45	3.79
Disk Bead	19.96	7.96	3.62
Disk Bead	11.56	2.84	2.86
Disk Bead	13.17	3.26	4.13
Disk Bead	14.15	3.45	3.37
Disk Bead	16.64	2.50	3.76
Disk Bead	15.98	5.43	5.72

Disk Bead	11.92	4.63	3.83
Disk Bead	12.52	3.96	4.26
Disk Bead	17.69	3.16	4.19
Disk Bead	12.63	3.88	4.66
Disk Bead	11.46	2.45	3.04
Disk Bead	20.52	6.69	6.34
Disk Bead	17.29	3.56	3.96
Disk Bead	13.65	7.11	4.20
Disk Bead	38.46	2.78	3.52
Disk Bead	12.25	7.98	4.06
Disk Bead	9.05	3.02	3.41
Disk Bead	20.03	5.36	5.27
Disk Bead	16.70	3.40	4.11
Disk Bead	19.57	4.56	5.11
Disk Bead	11.61	5.14	4.25
Disk Bead	10.96	3.28	3.20
Disk Bead	12.99	4.98	4.19
Disk Bead	21.66	3.35	3.64
Disk Bead	19.24	5.55	4.42
Disk Bead	12.16	5.10	2.54
Disk Bead	17.72	2.28	2.76
Disk Bead	13.10	2.25	3.51
Disk Bead	11.60	3.74	5.03
Disk Bead	12.58	3.36	4.51
Disk Bead	9.77	2.91	3.72
Disk Bead	14.66	5.26	3.61
Disk Bead	15.66	3.88	3.82
Disk Bead	15.48	2.22	2.95
Disk Bead	16.38	2.88	3.95
Disk Bead	15.44	3.08	3.33
Disk Bead	12.01	4.26	3.35
Disk Bead	13.30	1.72	2.40
Disk Bead	26.66	5.71	4.28
Disk Bead	24.60	11.70	4.84
Disk Bead	18.25	4.76	4.30
Disk Bead	27.68	5.37	3.18
Disk Bead	21.93	4.29	5.47
Disk Bead	16.02	3.65	4.17
Disk Bead	19.92	2.94	3.25
Disk Bead	12.83	3.20	2.99
Disk Bead	16.31	4.34	3.83
Disk Bead	15.22	3.48	3.27
Disk Bead	12.58	3.96	2.69
Disk Bead	16.71	1.72	3.32
Disk Bead	15.15	3.39	2.98
Disk Bead	10.07	4.29	3.15

Disk Bead	10.16	4.07	3.10
Disk Bead	10.26	2.91	3.24
Disk Bead	18.07	2.34	3.29
Disk Bead	12.68	3.96	3.37
Disk Bead	12.47	4.24	4.04
Disk Bead	10.77	2.80	3.40
Disk Bead	13.86	2.62	3.12
Disk Bead	18.38	3.79	3.67
Disk Bead	16.69	3.94	3.98
Disk Bead	16.84	2.89	3.57
Disk Bead	11.08	2.99	3.41
Disk Bead	13.01	2.90	4.02
Disk Bead	17.84	3.23	4.10
Disk Bead	11.27	4.54	4.33
Disk Bead	16.67	2.96	3.85
Disk Bead	9.61	4.26	3.43
Disk Bead	10.80	4.16	3.59
Disk Bead	17.84	4.51	3.78
Disk Bead	11.99	2.35	3.75
Disk Bead	16.09	5.13	2.94
Disk Bead	13.10	2.48	4.20
Disk Bead	10.58	4.05	2.16
Disk Bead	9.98	4.20	3.09
Disk Bead	10.12	4.13	3.85
Disk Bead	12.22	1.95	3.01
Disk Bead	10.52	3.71	2.33
Disk Bead	9.97	3.92	2.61
Disk Bead	12.19	3.37	3.30
Disk Bead	10.58	4.84	2.85
Disk Bead	12.66	4.42	3.32
Disk Bead	10.12	3.49	3.16
Disk Bead	9.06	3.77	2.79
Disk Bead	13.70	4.61	3.83
Disk Bead	10.90	4.57	4.07
Disk Bead	15.71	4.32	4.44
Disk Bead	10.72	3.84	3.35
Disk Bead	11.03	4.40	3.72
Disk Bead	10.52	3.78	2.94
Disk Bead	9.18	3.81	3.42
Disk Bead	12.78	3.01	2.24
Disk Bead	11.43	4.71	3.89
Disk Bead	9.36	2.85	3.20
Disk Bead	19.95	1.69	3.25
Disk Bead	26.97	8.58	4.45
Disk Bead	12.98	3.39	3.45
Disk Bead	24.58	3.20	4.65

Disk Bead	13.89	3.99	3.59
Disk Bead	12.95	4.30	3.33
Disk Bead	18.86	5.81	2.53
Disk Bead	20.41	6.78	3.75
Disk Bead	19.16	3.46	4.17
Disk Bead	17.83	4.15	6.19
Disk Bead	16.51	5.05	3.26
Disk Bead	14.54	3.36	4.92
Disk Bead	14.08	8.79	4.99
Disk Bead	17.19	3.47	3.55
Disk Bead	12.90	4.04	4.36
Disk Bead	16.45	8.21	5.99
Disk Bead	21.21	3.41	3.73
Disk Bead	14.15	1.89	2.62
Disk Bead	9.50	2.85	4.06
Disk Bead	16.62	2.79	3.89
Disk Bead	17.59	6.97	3.90
Disk Bead	12.33	5.18	4.68
Disk Bead	12.42	7.96	4.06
Disk Bead	11.52	4.40	3.76
Disk Bead	14.40	3.11	3.04
Disk Bead	11.59	4.44	3.82
Disk Bead	10.63	5.84	4.13
Disk Bead	11.57	2.81	3.58
Disk Bead	11.31	5.08	3.91
Disk Bead	16.80	4.83	4.14
Disk Bead	13.45	4.47	3.95
Disk Bead	9.42	2.39	2.77
Disk Bead	12.09	3.94	4.99
Disk Bead	11.04	6.42	3.28
Disk Bead	10.27	2.84	4.19
Disk Bead	12.09	5.25	4.72
Disk Bead	13.92	2.63	3.58
Disk Bead	10.26	5.90	3.74
Disk Bead	17.08	2.13	2.84
Disk Bead	13.28	2.14	3.60
Disk Bead	11.26	2.57	3.52
Disk Bead	13.21	4.63	3.84
Disk Bead	12.99	4.00	2.83
Disk Bead	13.86	2.80	2.75
Disk Bead	14.36	3.99	4.10
Disk Bead	11.58	3.30	3.18
Disk Bead	9.98	2.93	3.69
Disk Bead	12.27	3.06	3.32
Disk Bead	10.82	1.90	3.47
Disk Bead	10.82	3.32	3.60

Disk Bead	10.42	2.96	3.73
Disk Bead	25.99	9.43	4.24
Disk Bead	19.45	10.15	4.53
Disk Bead	19.68	4.33	4.07
Disk Bead	15.60	6.07	4.78
Disk Bead	17.77	6.19	3.91
Disk Bead	20.01	4.23	3.82
Disk Bead	22.39	5.45	4.52
Disk Bead	17.68	4.16	3.46
Disk Bead	11.97	4.14	3.80
Disk Bead	15.47	4.11	4.59
Disk Bead	14.01	3.16	3.73
Disk Bead	18.00	17.22	6.00
Disk Bead	12.74	4.88	3.43
Disk Bead	13.37	2.22	2.72
Disk Bead	14.76	2.90	3.24
Disk Bead	13.92	3.47	2.79
Disk Bead	10.39	4.90	2.19
Disk Bead	8.73	3.65	3.12
Disk Bead	21.13	3.77	4.45
Disk Bead	20.80	2.71	5.24
Disk Bead	22.29	8.20	6.68
Disk Bead	17.14	6.56	5.63
Disk Bead	16.46	4.31	4.26
Disk Bead	24.68	4.61	4.06
Disk Bead	18.36	4.15	3.14
Disk Bead	26.47	4.98	4.07
Disk Bead	17.08	3.70	4.33
Disk Bead	18.06	3.62	4.73
Disk Bead	26.40	6.79	4.18
Disk Bead	23.74	6.74	4.26
Disk Bead	15.06	3.81	2.32
Disk Bead	12.54	5.33	4.86
Disk Bead	23.48	5.47	6.05
Disk Bead	15.25	7.63	5.27
Disk Bead	25.53	6.41	6.42
Disk Bead	22.35	13.68	5.53
Disk Bead	17.23	4.99	4.68
Disk Bead	20.88	6.35	4.25
Disk Bead	21.92	3.36	4.22
Disk Bead	16.41	5.89	6.41
Disk Bead	15.39	4.30	4.29
Disk Bead	16.65	7.86	5.79
Disk Bead	14.24	6.17	4.23
Disk Bead	16.20	6.35	3.06
Disk Bead	17.88	3.25	3.77

Disk Bead	16.14	3.31	4.86
Disk Bead	17.00	4.77	4.52
Disk Bead	12.71	4.06	3.60
Disk Bead	11.28	5.12	4.05
Disk Bead	15.19	3.42	4.16
Disk Bead	11.25	3.67	3.75
Disk Bead	12.95	4.31	3.02
Disk Bead	13.24	1.97	3.13
Disk Bead	22.16	4.56	4.69
Disk Bead	18.19	8.13	5.93
Disk Bead	21.70	4.44	3.65
Disk Bead	16.30	4.09	4.28
Disk Bead	23.31	3.64	6.13
Disk Bead	16.08	8.30	3.97
Disk Bead	14.85	7.60	3.69
Disk Bead	21.29	5.01	4.53
Disk Bead	17.70	8.94	4.50
Disk Bead	12.77	2.21	3.36
Disk Bead	10.96	3.78	5.87
Disk Bead	13.09	3.78	5.09
Disk Bead	11.32	5.91	4.44
Disk Bead	15.45	3.64	2.57
Disk Bead	16.48	8.23	8.70
Disk Bead	14.76	6.23	6.07
Disk Bead	21.97	3.69	4.05
Disk Bead	13.55	5.70	4.43
Disk Bead	14.04	3.69	4.07
Disk Bead	17.13	3.60	4.20
Disk Bead	12.56	2.99	3.21
Disk Bead	13.06	3.64	3.63
Disk Bead	14.24	2.91	2.29
Disk Bead	21.43	2.89	3.63
Disk Bead	22.26	5.63	3.72
Disk Bead	17.60	4.96	3.56
Disk Bead	21.53	4.93	4.93
Disk Bead	25.32	4.09	5.09
Disk Bead	26.42	3.01	3.48
Disk Bead	20.87	4.72	5.59
Disk Bead	22.48	5.09	4.55
Disk Bead	16.71	6.00	4.08
Disk Bead	14.49	8.72	4.92
Disk Bead	16.37	5.55	3.76
Disk Bead	13.60	3.99	3.92
Disk Bead	20.94	3.50	4.08
Disk Bead	17.25	2.76	3.62
Disk Bead	13.23	3.60	2.61

Disk Bead	17.13	4.61	3.96
Disk Bead	14.57	6.21	4.03
Disk Bead	13.01	5.40	4.06
Disk Bead	14.23	3.42	3.79
Disk Bead	11.40	2.54	3.07
Disk Bead	11.81	3.60	3.15
Disk Bead	11.72	2.30	2.31
Disk Bead	10.65	2.81	3.62
Disk Bead	11.28	6.98	3.33
Disk Bead	23.79	6.06	4.88
Disk Bead	21.14	3.91	3.88
Disk Bead	16.81	4.03	4.31
Disk Bead	11.70	3.19	3.07
Disk Bead	26.66	9.76	4.58
Disk Bead	20.77	2.71	4.12
Disk Bead	15.70	3.55	4.30
Disk Bead	19.33	9.03	5.87
Disk Bead	17.28	6.37	4.09
Disk Bead	12.24	5.37	4.01
Disk Bead	13.85	4.73	4.06
Disk Bead	9.68	3.68	3.21
Disk Bead	11.51	3.97	3.10
Disk Bead	13.41	2.26	3.48
Disk Bead	12.90	4.34	3.31
Disk Bead	11.81	4.41	4.22
Disk Bead	10.67	3.41	3.06
Disk Bead	11.62	4.42	2.56
Disk Bead	9.53	3.26	4.64
Disk Bead	11.81	2.94	3.58
Disk Bead	33.66	7.87	3.39
Disk Bead	22.88	8.81	3.93
Disk Bead	23.57	3.81	3.06
Disk Bead	21.36	10.01	4.36
Disk Bead	13.04	5.81	3.83
Disk Bead	13.13	3.47	3.68
Disk Bead	17.30	4.72	5.97
Disk Bead	21.40	2.76	2.47
Disk Bead	13.35	3.75	3.28
Disk Bead	10.40	2.96	3.59
Disk Bead	15.29	4.85	3.78
Disk Bead	19.86	10.20	3.51
Disk Bead	18.80	5.46	4.30
Disk Bead	16.28	2.74	3.00
Disk Bead	19.55	4.65	4.07
Disk Bead	19.32	5.81	3.51
Disk Bead	15.03	1.65	3.23

Disk Bead	17.59	4.20	3.90
Disk Bead	17.65	7.17	4.91
Disk Bead	13.90	7.37	3.24
Disk Bead	14.70	4.91	3.50
Disk Bead	22.03	2.71	4.20
Disk Bead	14.50	2.84	3.52
Disk Bead	11.90	3.82	3.18
Disk Bead	16.79	3.62	3.33
Disk Bead	15.91	3.71	2.51
Disk Bead	10.97	4.75	3.92
Disk Bead	13.90	3.51	3.28
Disk Bead	12.29	6.68	4.23
Disk Bead	19.49	3.33	3.73
Disk Bead	12.62	2.87	3.42
Disk Bead	10.50	5.43	3.50
Disk Bead	10.60	3.71	3.95
Disk Bead	16.83	3.20	3.16
Disk Bead	14.44	4.38	3.19
Disk Bead	10.19	5.16	3.82
Disk Bead	10.32	2.65	3.17
Disk Bead	14.76	4.15	3.68
Disk Bead	11.72	2.86	3.87
Disk Bead	13.70	3.58	4.36
Disk Bead	16.14	4.86	2.94
Disk Bead	15.47	3.68	3.12
Disk Bead	9.94	3.79	3.84
Disk Bead	10.86	3.62	2.88
Disk Bead	16.33	4.70	3.99
Disk Bead	25.72	12.61	5.98
Disk Bead	23.47	7.06	3.16
Disk Bead	16.58	3.13	3.22
Disk Bead	24.31	7.11	4.45
Disk Bead	22.49	5.67	4.30
Disk Bead	17.07	5.91	4.72
Disk Bead	18.31	2.62	3.09
Disk Bead	16.10	5.56	3.71
Disk Bead	11.11	5.32	3.63
Disk Bead	14.75	2.25	2.98
Disk Bead	17.01	4.82	4.84
Disk Bead	15.77	5.65	4.50
Disk Bead	17.99	6.56	3.83
Disk Bead	18.29	4.92	3.72
Disk Bead	13.92	5.29	4.07
Disk Bead	17.15	5.10	3.81
Disk Bead	15.72	4.97	3.75
Disk Bead	16.28	4.64	3.48

Disk Bead	13.41	6.21	5.20
Disk Bead	10.16	3.04	3.14
Disk Bead	17.65	4.28	3.36
Disk Bead	14.57	3.57	3.34
Disk Bead	16.65	3.30	3.00
Disk Bead	16.27	3.63	4.55
Disk Bead	15.10	3.59	3.58
Disk Bead	14.30	3.26	3.77
Disk Bead	11.12	5.31	3.44
Disk Bead	13.03	3.69	3.71
Disk Bead	15.12	3.10	4.26
Disk Bead	10.71	3.12	3.98
Disk Bead	13.24	3.95	5.12
Disk Bead	13.60	2.56	4.78
Disk Bead	9.93	2.44	3.29
Disk Bead	11.14	3.25	3.16
Disk Bead	33.66	4.27	3.99
AVERAGES (mm)	**15.70**	**4.52**	**3.98**

Broken or incomplete beads were not measured and are not included in these size averages
Total beads 888

Table A.6 Wislon Mound Bundle #32 Disk Beads

Artifact Type	Length (mm)	Thickness (mm)	Drill Hole Diameter (mm)
Disk Bead	19.80	3.70	4.62
Disk Bead	12.32	3.29	3.01
Disk Bead	15.82	4.56	5.02
Disk Bead	11.96	3.57	3.00
Disk Bead	11.36	3.88	4.66
Disk Bead	11.21	2.37	3.03
Disk Bead	8.82	3.56	2.11
Disk Bead	10.12	3.70	3.52
Disk Bead	22.72	8.14	4.01
Disk Bead	14.72	4.30	3.84
Disk Bead	15.87	3.70	4.49
Disk Bead	17.79	4.57	3.18
Disk Bead	13.45	4.05	3.29
Disk Bead	19.03	5.28	6.28
Disk Bead	13.36	5.54	6.07
Disk Bead	13.09	6.18	3.56
Disk Bead	14.53	4.68	3.22
Disk Bead	13.02	2.80	3.34
Disk Bead	10.92	2.57	3.11
Disk Bead	14.81	3.07	3.18
Disk Bead	26.36	5.18	2.81
Disk Bead	21.12	6.53	4.44
Disk Bead	16.54	6.45	2.87
Disk Bead	16.79	4.00	3.56
Disk Bead	24.95	3.00	3.81
Disk Bead	25.21	3.84	4.45
Disk Bead	14.82	2.44	3.14
Disk Bead	26.85	9.56	5.82
Disk Bead	12.30	5.16	4.01
Disk Bead	19.77	6.05	4.31
Disk Bead	15.84	4.38	3.55
Disk Bead	13.77	4.00	3.91
Disk Bead	16.98	3.14	3.23
Disk Bead	14.76	3.30	3.89
Disk Bead	15.78	3.72	3.11
Disk Bead	15.45	5.76	4.24
Disk Bead	8.88	4.12	2.51
Disk Bead	8.30	5.38	4.46
Disk Bead	14.28	4.17	4.09
Disk Bead	11.65	2.74	3.11
Disk Bead	37.99	6.35	5.40
Disk Bead	24.38	4.89	3.98
Disk Bead	20.82	6.31	5.48
Disk Bead	21.27	5.02	3.55

Disk Bead	19.03	5.85	5.07
Disk Bead	22.94	3.51	3.45
Disk Bead	15.14	2.93	3.76
Disk Bead	16.45	3.81	4.46
Disk Bead	28.04	3.83	3.96
Disk Bead	14.79	5.02	4.07
Disk Bead	13.49	3.69	3.54
Disk Bead	18.61	4.84	6.03
Disk Bead	13.12	4.99	4.06
Disk Bead	13.34	8.12	4.06
Disk Bead	16.37	1.99	3.27
Disk Bead	16.63	5.63	6.40
Disk Bead	13.91	4.58	3.81
Disk Bead	14.60	6.88	5.42
Disk Bead	12.54	4.02	3.92
Disk Bead	11.92	5.70	4.22
Disk Bead	15.61	5.34	4.91
Disk Bead	14.38	5.05	5.08
Disk Bead	15.11	2.81	3.71
Disk Bead	17.26	4.19	4.44
Disk Bead	13.33	3.33	3.68
Disk Bead	21.34	6.22	3.84
Disk Bead	12.14	3.02	3.14
Disk Bead	14.53	3.60	3.72
Disk Bead	13.39	2.76	2.96
Disk Bead	9.89	2.78	3.07
Disk Bead	13.15	2.81	4.22
Disk Bead	10.10	2.45	3.70
Disk Bead	10.64	3.39	3.84
Disk Bead	8.86	3.28	3.11
Disk Bead	10.51	3.99	4.02
Disk Bead	9.99	2.25	3.30
Disk Bead	9.43	1.40	2.11
Disk Bead	8.79	2.32	2.25
Disk Bead	15.65	2.61	4.10
Disk Bead	16.43	4.46	3.71
Disk Bead	16.51	4.32	3.65
Disk Bead	15.41	3.85	4.11
Disk Bead	13.42	3.26	3.86
Disk Bead	16.30	5.99	4.67
Disk Bead	14.87	6.35	4.23
Disk Bead	13.85	2.66	3.70
Disk Bead	18.87	3.38	5.92
Disk Bead	16.16	3.94	5.71
Disk Bead	12.80	4.82	5.16
Disk Bead	14.37	2.96	3.62

Disk Bead	12.63	2.47	2.69
Disk Bead	13.92	2.48	4.73
Disk Bead	13.14	3.74	3.22
Disk Bead	13.84	2.16	4.72
Disk Bead	8.91	3.17	4.17
Disk Bead	11.71	1.84	3.23
Disk Bead	30.35	6.07	6.71
Disk Bead	17.98	4.87	5.72
Disk Bead	18.06	3.59	4.50
Disk Bead	18.76	4.11	4.00
Disk Bead	18.88	3.04	3.69
Disk Bead	18.45	3.69	4.24
Disk Bead	16.85	5.33	4.36
Disk Bead	15.04	3.73	4.42
Disk Bead	13.34	3.59	3.66
Disk Bead	15.88	2.36	4.09
Disk Bead	16.36	2.54	3.20
Disk Bead	34.17	5.17	4.28
Disk Bead	31.72	6.55	6.17
Disk Bead	15.26	4.34	6.16
Disk Bead	15.03	3.56	4.88
Disk Bead	15.07	3.79	4.42
Disk Bead	17.99	3.08	2.73
Disk Bead	14.98	3.64	2.78
Disk Bead	16.39	3.69	4.43
Disk Bead	16.22	6.64	3.74
Disk Bead	22.86	3.68	3.65
Disk Bead	15.86	4.16	4.39
Disk Bead	23.62	7.35	4.84
Disk Bead	14.10	4.85	4.02
Disk Bead	15.02	4.94	3.05
Disk Bead	17.20	5.23	4.66
Disk Bead	17.10	2.82	4.88
Disk Bead	18.22	3.52	5.61
Disk Bead	21.12	9.76	7.14
Disk Bead	11.75	3.97	3.87
Disk Bead	14.28	3.23	3.88
Disk Bead	13.41	5.76	4.72
Disk Bead	16.24	4.01	4.78
Disk Bead	11.64	4.63	2.86
Disk Bead	14.90	5.81	4.65
Disk Bead	17.80	8.67	5.19
Disk Bead	17.90	3.65	4.20
Disk Bead	13.24	4.28	4.34
Disk Bead	14.25	5.67	4.73
Disk Bead	12.42	2.69	3.21

Disk Bead	17.76	3.99	4.15
Disk Bead	12.39	3.97	2.81
Disk Bead	12.91	7.68	4.29
Disk Bead	16.31	3.86	3.38
Disk Bead	15.23	2.76	4.47
Disk Bead	15.46	2.91	3.78
Disk Bead	13.91	4.26	4.22
Disk Bead	13.69	2.53	3.76
Disk Bead	14.84	6.54	4.97
Disk Bead	15.11	3.66	3.13
Disk Bead	13.38	3.76	4.24
Disk Bead	10.69	5.07	3.31
Disk Bead	38.58	5.55	5.50
Disk Bead	15.34	3.88	5.96
Disk Bead	12.58	3.64	5.95
Disk Bead	20.42	2.71	3.83
Disk Bead	17.25	3.63	3.59
Disk Bead	14.84	3.73	3.64
Disk Bead	15.63	3.78	5.08
Disk Bead	14.17	2.96	4.50
Disk Bead	11.84	2.97	3.96
Disk Bead	11.76	5.18	3.45
Disk Bead	11.36	3.41	3.35
Disk Bead	11.83	3.95	3.97
Disk Bead	9.88	4.07	4.11
Disk Bead	13.85	4.04	3.64
Disk Bead	9.45	3.35	3.28
Disk Bead	9.11	3.32	3.78
Disk Bead	12.02	4.02	3.63
Disk Bead	15.10	3.63	3.43
Disk Bead	13.08	3.87	4.03
Disk Bead	11.63	2.17	4.73
Disk Bead	13.27	3.17	4.82
Disk Bead	10.86	4.19	3.39
Disk Bead	10.41	4.45	5.78
Disk Bead	10.48	3.25	5.02
Disk Bead	11.17	1.55	3.01
Disk Bead	11.23	3.83	4.06
Disk Bead	12.16	3.51	4.03
Disk Bead	12.33	2.85	2.78
Disk Bead	21.21	3.79	4.26
Disk Bead	8.07	2.35	3.98
Disk Bead	10.51	3.63	3.27
Disk Bead	11.46	1.51	2.72
Disk Bead	29.23	5.33	5.36
Disk Bead	21.02	5.80	4.48

Disk Bead	17.65	7.05	5.01
Disk Bead	19.92	2.78	4.56
Disk Bead	21.34	3.19	5.14
Disk Bead	17.07	4.86	5.96
Disk Bead	17.58	8.88	4.69
Disk Bead	13.87	6.24	5.06
Disk Bead	18.96	6.17	5.04
Disk Bead	34.44	3.91	4.70
Disk Bead	14.71	5.42	5.77
Disk Bead	12.18	2.76	4.55
Disk Bead	21.82	8.83	5.82
Disk Bead	21.80	2.12	2.88
Disk Bead	18.18	8.93	5.42
Disk Bead	17.84	4.24	3.26
Disk Bead	13.67	4.05	3.82
Disk Bead	11.66	6.36	4.01
Disk Bead	13.35	2.72	4.51
Disk Bead	14.30	4.32	4.63
Disk Bead	8.66	4.95	4.20
Disk Bead	13.90	2.97	3.45
Disk Bead	11.57	1.92	3.22
Disk Bead	15.12	3.59	3.38
Disk Bead	15.46	6.06	4.37
Disk Bead	24.51	5.33	5.04
Disk Bead	17.40	6.87	4.45
Disk Bead	12.91	4.83	5.54
Disk Bead	16.30	3.05	4.10
Disk Bead	15.73	3.08	4.66
Disk Bead	13.22	2.94	4.81
Disk Bead	17.68	2.34	3.78
Disk Bead	14.84	4.14	4.74
Disk Bead	15.73	2.74	4.12
Disk Bead	10.85	2.67	4.68
Disk Bead	12.01	5.06	4.41
Disk Bead	11.06	3.25	4.80
Disk Bead	14.43	2.81	4.15
Disk Bead	12.21	3.35	4.31
Disk Bead	8.67	2.74	3.90
Disk Bead	23.32	9.85	3.64
Disk Bead	18.11	5.35	4.04
Disk Bead	19.00	2.93	3.39
Disk Bead	21.40	3.16	2.89
Disk Bead	33.56	5.23	5.22
Disk Bead	17.40	2.84	3.45
Disk Bead	12.83	10.25	4.25
Disk Bead	12.70	9.29	4.16

Disk Bead	12.11	5.18	4.62
Disk Bead	17.75	7.41	4.61
Disk Bead	11.31	6.06	3.07
Disk Bead	38.21	6.34	5.42
Disk Bead	30.12	4.94	7.45
Disk Bead	21.70	5.96	4.15
Disk Bead	23.60	5.47	4.22
Disk Bead	14.17	4.80	4.44
Disk Bead	14.38	2.39	3.58
Disk Bead	15.97	4.42	5.15
Disk Bead	18.46	3.38	3.09
Disk Bead	18.63	3.76	3.15
Disk Bead	14.88	5.91	4.06
Disk Bead	16.17	3.15	3.57
Disk Bead	15.53	5.40	5.63
Disk Bead	14.72	6.48	3.60
Disk Bead	14.14	4.99	4.33
Disk Bead	13.54	5.36	3.77
Disk Bead	15.66	3.96	3.87
Disk Bead	13.62	4.45	3.36
Disk Bead	16.41	5.96	3.91
Disk Bead	11.80	6.34	3.46
Disk Bead	12.18	4.54	5.13
Disk Bead	13.21	4.07	3.35
Disk Bead	10.61	6.02	4.06
Disk Bead	15.21	3.50	4.43
Disk Bead	13.23	6.61	4.82
Disk Bead	15.70	5.63	4.21
Disk Bead	15.08	5.08	3.50
Disk Bead	12.72	4.63	4.00
Disk Bead	15.98	5.63	5.91
Disk Bead	13.63	4.45	3.85
Disk Bead	12.37	2.12	3.64
Disk Bead	10.81	2.31	2.49
Disk Bead	13.82	3.56	3.97
Disk Bead	12.84	2.48	3.46
Disk Bead	25.89	4.82	6.45
AVERAGES (mm)	**15.81**	**4.34**	**4.16**

Broken or incomplete beads were not measured and are not included in these size averages
Total beads 264

Table A.7 Wislon Mound Bundle #37 Disk Beads

Artifact Type	Length (mm)	Thickness (mm)	Drill Hole Diameter (mm)
Disk Bead	12.05	5.73	3.30
Disk Bead	18.07	4.97	3.54
Disk Bead	7.23	4.22	3.47
Disk Bead	9.09	2.72	4.59
Disk Bead	11.70	3.12	4.31
Disk Bead	12.91	4.65	3.38
Disk Bead	14.78	1.65	2.80
Disk Bead	11.55	2.37	3.64
Disk Bead	16.45	4.59	4.66
Disk Bead	12.86	2.11	3.40
Disk Bead	14.57	2.93	3.55
Disk Bead	10.14	2.92	3.11
Disk Bead	8.26	3.70	3.60
Disk Bead	9.10	1.61	1.97
Disk Bead	12.06	4.61	4.65
Disk Bead	16.52	2.93	4.52
Disk Bead	14.19	4.20	4.03
Disk Bead	16.49	4.78	3.58
Disk Bead	11.55	5.76	3.98
Disk Bead	11.23	3.37	3.41
Disk Bead	10.04	3.61	3.87
Disk Bead	9.27	3.90	3.60
Disk Bead	11.45	2.50	2.86
Disk Bead	11.48	4.40	3.92
Disk Bead	8.36	3.44	4.03
Disk Bead	12.12	4.82	4.15
Disk Bead	12.99	3.64	4.25
Disk Bead	12.03	3.92	4.92
Disk Bead	9.24	2.59	3.50
Disk Bead	11.18	1.86	2.70
Disk Bead	10.60	2.79	3.37
Disk Bead	9.33	4.20	4.33
Disk Bead	9.23	2.30	3.11
Disk Bead	12.00	2.25	3.68
Disk Bead	9.22	4.90	3.17
Disk Bead	9.14	3.16	2.55
Disk Bead	13.83	5.55	4.66
Disk Bead	13.48	2.22	4.28
Disk Bead	20.15	2.34	4.81
Disk Bead	12.53	3.34	3.53
Disk Bead	11.88	2.34	4.41
Disk Bead	11.17	4.80	3.30
Disk Bead	15.04	5.76	4.32
Disk Bead	15.76	3.07	3.52

Disk Bead	11.72	3.53	3.32
Disk Bead	11.03	4.73	3.86
Disk Bead	11.07	3.98	4.04
Disk Bead	12.52	2.86	2.37
Disk Bead	12.07	4.43	4.12
Disk Bead	13.77	2.67	4.39
Disk Bead	12.42	3.32	3.93
Disk Bead	13.41	4.52	3.88
Disk Bead	10.12	4.52	3.83
Disk Bead	11.11	5.32	4.54
Disk Bead	9.88	2.88	4.13
Disk Bead	9.55	2.98	3.84
Disk Bead	12.65	3.60	3.55
Disk Bead	12.91	3.36	4.79
Disk Bead	11.55	3.41	4.72
Disk Bead	9.90	3.22	3.24
Disk Bead	7.23	3.82	2.64
Disk Bead	12.32	5.74	3.52
Disk Bead	9.62	4.68	3.61
Disk Bead	9.13	3.61	3.74
Disk Bead	9.90	2.23	2.89
Disk Bead	8.51	4.70	3.44
Disk Bead	12.21	3.32	3.18
Disk Bead	9.98	3.16	2.53
Disk Bead	11.86	4.99	2.82
Disk Bead	10.88	3.40	4.56
Disk Bead	10.91	1.94	3.97
Disk Bead	8.62	5.02	3.51
Disk Bead	10.71	2.96	3.53
Disk Bead	10.54	4.17	3.46
Disk Bead	11.68	3.16	3.64
Disk Bead	10.87	2.79	3.67
Disk Bead	8.23	3.75	3.70
Disk Bead	10.99	2.92	3.46
Disk Bead	8.78	1.69	3.07
Disk Bead	10.22	1.20	2.71
Disk Bead	8.96	2.12	3.22
Disk Bead	10.75	2.54	3.33
Disk Bead	8.69	3.65	2.90
Disk Bead	12.94	3.26	3.31
Disk Bead	10.95	2.99	3.32
Disk Bead	7.69	2.63	3.52
Disk Bead	8.29	2.41	3.72
Disk Bead	11.78	2.15	3.06
Disk Bead	10.84	3.29	2.75
Disk Bead	9.19	4.46	3.94

Disk Bead	11.64	3.38	4.67
Disk Bead	9.65	4.17	2.93
Disk Bead	9.22	3.65	3.03
Disk Bead	9.34	4.00	3.79
Disk Bead	12.47	3.07	3.17
Disk Bead	8.66	2.78	2.94
Disk Bead	12.83	3.39	3.70
Disk Bead	13.95	2.73	3.56
Disk Bead	12.50	4.56	4.16
Disk Bead	11.08	3.72	3.34
Disk Bead	11.35	5.23	4.05
Disk Bead	11.07	4.13	3.82
Disk Bead	12.68	1.55	3.59
Disk Bead	14.99	5.52	4.67
Disk Bead	10.81	2.15	2.88
Disk Bead	11.58	3.46	3.05
Disk Bead	7.89	4.94	4.23
Disk Bead	13.19	5.59	4.55
Disk Bead	8.93	3.76	3.11
Disk Bead	8.20	3.21	3.13
Disk Bead	14.77	3.29	4.21
Disk Bead	8.95	3.61	3.36
Disk Bead	25.20	5.80	6.10
Disk Bead	19.05	9.79	4.69
Disk Bead	17.60	6.19	4.75
Disk Bead	21.07	5.97	4.95
Disk Bead	32.31	4.82	7.43
Disk Bead	15.16	7.66	5.09
Disk Bead	10.28	3.11	3.71
Disk Bead	11.00	3.00	3.24
Disk Bead	14.80	4.91	3.86
Disk Bead	13.49	5.33	3.92
Disk Bead	17.08	3.35	4.74
Disk Bead	11.58	6.66	3.97
Disk Bead	13.25	3.67	3.19
Disk Bead	16.51	3.06	4.19
Disk Bead	12.76	2.79	3.84
Disk Bead	13.55	1.87	3.72
Disk Bead	13.95	2.42	3.14
Disk Bead	13.71	4.60	3.84
Disk Bead	11.11	1.98	3.87
Disk Bead	12.34	2.97	3.29
Disk Bead	13.16	5.55	4.08
Disk Bead	12.28	3.61	5.14
Disk Bead	12.62	3.70	4.78
Disk Bead	16.48	3.82	4.25

Disk Bead	11.17	6.52	3.34
Disk Bead	9.78	2.68	2.85
Disk Bead	12.69	3.34	3.78
Disk Bead	12.37	2.78	4.44
Disk Bead	12.40	4.03	3.71
Disk Bead	12.25	5.22	3.34
Disk Bead	9.69	3.89	3.36
Disk Bead	10.58	2.37	3.25
Disk Bead	8.86	2.75	2.62
Disk Bead	8.25	2.57	2.80
Disk Bead	8.78	3.20	3.10
Disk Bead	9.71	4.58	3.37
Disk Bead	12.27	7.26	3.72
Disk Bead	10.16	4.60	3.62
Disk Bead	12.46	3.84	4.33
Disk Bead	10.52	3.56	4.23
Disk Bead	11.43	4.43	4.61
Disk Bead	11.62	3.84	3.41
Disk Bead	16.04	2.57	4.27
Disk Bead	13.63	4.80	3.58
Disk Bead	11.41	7.36	3.87
Disk Bead	14.36	4.07	3.88
Disk Bead	9.62	4.43	3.61
Disk Bead	15.00	3.85	3.74
Disk Bead	15.71	6.07	4.28
Disk Bead	14.48	6.71	4.12
Disk Bead	15.47	7.29	6.86
Disk Bead	20.41	3.65	3.43
Disk Bead	22.95	2.36	2.93
Disk Bead	21.68	11.08	4.45
Disk Bead	24.53	6.38	3.93
Disk Bead	18.00	6.86	4.71
Disk Bead	17.48	9.47	3.93
Disk Bead	17.05	5.78	4.65
Disk Bead	20.66	6.79	5.42
Disk Bead	18.89	4.86	4.05
Disk Bead	14.32	3.59	4.92
Disk Bead	15.77	3.50	2.97
Disk Bead	16.43	4.47	4.34
Disk Bead	17.47	3.86	4.27
Disk Bead	19.09	4.59	3.91
Disk Bead	13.91	4.01	4.39
Disk Bead	10.18	3.48	4.46
Disk Bead	14.03	3.78	2.12
Disk Bead	12.83	2.29	3.54
Disk Bead	19.86	3.61	5.32

Disk Bead	15.25	8.13	4.61
Disk Bead	15.69	4.51	3.57
Disk Bead	18.31	6.72	5.91
Disk Bead	24.10	7.35	5.17
Disk Bead	14.72	4.23	4.84
Disk Bead	20.33	9.03	6.32
Disk Bead	9.11	4.52	3.00
Disk Bead	12.09	3.42	4.06
Disk Bead	13.91	4.98	5.24
Disk Bead	11.34	4.87	4.48
Disk Bead	11.95	2.90	2.87
Disk Bead	12.39	5.15	3.38
Disk Bead	11.30	4.90	4.24
Disk Bead	15.90	3.12	4.41
Disk Bead	13.71	3.61	3.98
Disk Bead	14.15	2.66	3.82
Disk Bead	17.53	4.21	3.54
Disk Bead	10.85	3.06	3.07
Disk Bead	9.83	5.33	3.74
Disk Bead	14.90	4.38	5.46
Disk Bead	13.97	2.65	2.83
Disk Bead	11.89	4.66	3.90
Disk Bead	17.51	3.07	3.72
Disk Bead	14.46	4.65	3.16
Disk Bead	12.78	2.16	3.55
Disk Bead	17.83	4.68	4.34
Disk Bead	18.24	6.41	4.22
Disk Bead	19.62	7.79	3.85
Disk Bead	14.79	2.66	4.97
Disk Bead	12.04	4.98	3.61
Disk Bead	9.10	3.88	3.61
Disk Bead	12.51	4.47	3.40
Disk Bead	14.47	4.08	4.18
Disk Bead	15.40	4.25	3.67
Disk Bead	12.06	4.61	4.08
Disk Bead	12.20	4.52	4.10
Disk Bead	10.16	3.19	2.34
Disk Bead	7.81	2.32	2.81
Disk Bead	10.79	2.86	3.51
Disk Bead	8.94	3.46	3.54
Disk Bead	39.86	4.76	6.46
Disk Bead	25.07	6.57	5.11
Disk Bead	22.74	4.05	4.16
Disk Bead	21.53	8.23	4.58
Disk Bead	22.94	5.46	3.02
Disk Bead	14.74	9.75	3.80

Disk Bead	14.53	3.45	3.78
Disk Bead	9.24	7.14	3.59
Disk Bead	12.92	4.33	3.52
Disk Bead	14.40	2.80	3.12
Disk Bead	22.89	4.20	5.93
Disk Bead	14.70	4.78	4.28
Disk Bead	14.06	9.22	4.44
Disk Bead	25.10	4.83	2.96
Disk Bead	13.80	3.14	3.07
Disk Bead	23.78	6.68	4.69
Disk Bead	18.09	3.92	3.50
Disk Bead	15.60	2.79	4.71
Disk Bead	15.85	3.19	2.93
Disk Bead	19.34	3.92	4.63
Disk Bead	17.80	4.39	3.51
Disk Bead	16.17	6.24	3.77
Disk Bead	14.52	3.48	3.89
Disk Bead	10.70	2.41	2.95
Disk Bead	12.38	3.70	3.69
Disk Bead	10.70	2.89	3.52
Disk Bead	9.65	2.83	3.38
Disk Bead	11.37	4.10	3.33
Disk Bead	8.59	4.94	2.96
Disk Bead	11.49	2.22	2.97
Disk Bead	14.89	3.80	3.23
Disk Bead	27.06	4.98	3.34
Disk Bead	26.01	5.43	4.70
Disk Bead	19.33	7.38	5.89
Disk Bead	20.73	9.45	3.99
Disk Bead	13.56	5.15	4.25
Disk Bead	15.00	4.82	3.75
Disk Bead	15.24	4.82	3.75
Disk Bead	13.98	3.18	3.88
Disk Bead	16.08	4.21	2.47
Disk Bead	14.93	2.30	4.38
Disk Bead	14.79	5.61	4.43
Disk Bead	13.65	3.72	3.25
Disk Bead	14.41	3.24	3.03
Disk Bead	21.78	3.98	4.82
Disk Bead	17.33	1.91	2.57
Disk Bead	17.67	4.00	4.15
Disk Bead	18.12	5.61	4.84
Disk Bead	15.12	5.54	3.97
Disk Bead	12.48	4.03	3.92
Disk Bead	22.00	8.50	4.46
Disk Bead	8.25	8.53	4.43

Disk Bead	16.68	6.08	4.48
Disk Bead	15.60	4.35	3.84
Disk Bead	11.76	6.86	4.16
Disk Bead	12.98	3.08	3.18
Disk Bead	14.66	3.86	3.68
Disk Bead	13.88	5.46	3.87
Disk Bead	11.37	3.60	3.54
Disk Bead	11.19	2.45	3.73
Disk Bead	14.38	6.32	3.85
Disk Bead	10.46	2.22	2.61
Disk Bead	13.70	6.77	4.68
Disk Bead	17.92	7.30	5.97
Disk Bead	22.66	9.61	4.05
Disk Bead	15.43	5.83	3.86
Disk Bead	19.65	6.37	3.34
Disk Bead	15.66	4.82	4.36
Disk Bead	11.81	4.32	3.60
Disk Bead	14.13	7.63	4.41
Disk Bead	13.96	4.94	3.51
Disk Bead	16.84	3.34	3.30
Disk Bead	14.15	2.82	3.28
Disk Bead	20.27	2.83	4.04
Disk Bead	16.34	3.59	4.77
Disk Bead	14.08	3.91	3.66
Disk Bead	15.54	3.56	3.84
Disk Bead	11.88	3.37	3.68
Disk Bead	12.71	2.70	3.02
Disk Bead	13.49	3.62	3.42
Disk Bead	12.21	2.39	2.68
Disk Bead	15.51	3.47	3.17
Disk Bead	12.11	2.90	4.02
Disk Bead	9.56	2.67	2.86
Disk Bead	12.16	2.57	4.23
Disk Bead	11.59	2.06	2.62
Disk Bead	20.52	4.37	5.33
Disk Bead	21.87	2.21	2.76
Disk Bead	26.31	10.44	3.80
Disk Bead	19.09	4.05	3.80
Disk Bead	18.63	4.58	5.50
Disk Bead	17.80	5.91	3.71
Disk Bead	17.61	10.40	4.79
Disk Bead	24.51	3.17	4.09
Disk Bead	24.03	3.53	4.99
Disk Bead	15.51	4.10	3.43
Disk Bead	13.88	4.69	4.86
Disk Bead	19.94	9.55	4.65

Disk Bead	14.65	3.39	2.66
Disk Bead	17.06	3.34	3.13
Disk Bead	13.63	4.03	3.66
Disk Bead	15.97	4.20	3.66
Disk Bead	13.05	4.30	3.27
Disk Bead	14.03	5.46	3.13
Disk Bead	13.67	4.56	4.67
Disk Bead	13.35	4.58	5.03
Disk Bead	11.41	4.79	4.26
Disk Bead	17.11	3.57	3.68
Disk Bead	13.53	2.54	2.85
Disk Bead	15.61	3.85	3.44
Disk Bead	12.89	4.35	4.10
Disk Bead	10.60	3.67	5.31
Disk Bead	15.74	2.13	4.76
Disk Bead	7.86	3.21	1.74
Disk Bead	33.17	9.45	6.94
Disk Bead	23.92	4.74	4.79
Disk Bead	18.39	6.15	4.71
Disk Bead	16.76	6.29	3.26
Disk Bead	21.93	5.79	4.09
Disk Bead	23.00	9.64	4.49
Disk Bead	16.57	4.67	3.96
Disk Bead	15.10	6.59	4.17
Disk Bead	12.90	2.86	2.82
Disk Bead	29.23	2.81	3.41
Disk Bead	21.13	3.95	5.15
Disk Bead	17.61	6.14	5.16
Disk Bead	12.15	3.71	4.20
Disk Bead	25.84	4.41	4.04
Disk Bead	16.74	4.81	4.28
Disk Bead	20.45	2.77	4.27
Disk Bead	19.82	6.17	4.30
Disk Bead	15.57	3.86	4.28
Disk Bead	13.41	3.58	3.65
Disk Bead	13.09	6.20	4.73
Disk Bead	17.21	7.96	4.26
Disk Bead	12.68	5.36	4.51
Disk Bead	21.77	4.47	4.26
Disk Bead	22.59	5.85	5.86
Disk Bead	11.83	4.79	4.03
Disk Bead	11.23	4.25	3.62
Disk Bead	16.71	3.07	4.40
Disk Bead	4.83	2.90	4.92
Disk Bead	20.65	4.89	4.82
Disk Bead	13.40	3.08	3.70

Disk Bead	17.27	4.87	6.07
Disk Bead	15.75	3.35	3.44
Disk Bead	18.77	2.74	4.01
Disk Bead	13.78	5.20	3.67
Disk Bead	11.64	5.29	4.26
Disk Bead	14.67	3.20	2.78
Disk Bead	12.96	3.61	3.10
Disk Bead	10.12	6.81	3.76
Disk Bead	15.06	2.73	2.81
Disk Bead	15.22	3.23	3.74
Disk Bead	11.06	3.82	3.11
Disk Bead	8.27	4.49	4.65
Disk Bead	10.05	3.74	3.65
Disk Bead	14.06	2.97	3.72
Disk Bead	9.55	3.54	3.09
Disk Bead	12.26	2.67	2.89
Disk Bead	16.39	3.93	2.76
Disk Bead	12.23	2.34	4.00
Disk Bead	12.40	3.39	4.09
Disk Bead	10.58	3.23	2.80
Disk Bead	12.11	2.83	3.39
Disk Bead	8.76	3.31	3.97
Disk Bead	12.88	2.00	2.83
Disk Bead	13.04	3.06	3.12
Disk Bead	16.55	4.02	3.67
Disk Bead	14.44	3.02	3.00
Disk Bead	14.62	4.21	2.84
Disk Bead	10.24	2.91	3.00
Disk Bead	9.31	2.86	3.28
Disk Bead	8.67	1.53	2.63
Disk Bead	10.97	2.39	2.62
Disk Bead	11.47	2.14	3.29
Disk Bead	10.92	3.01	3.42
Disk Bead	10.00	4.21	3.24
Disk Bead	7.91	2.53	2.97
Disk Bead	9.28	3.23	3.97
Disk Bead	10.10	3.16	3.23
Disk Bead	10.10	3.47	2.85
Disk Bead	10.60	2.10	3.15
Disk Bead	9.83	3.36	3.45
Disk Bead	8.79	2.80	2.55
Disk Bead	8.27	2.43	2.54
Disk Bead	22.45	8.67	5.89
Disk Bead	25.12	5.57	5.58
Disk Bead	18.51	5.33	4.41
Disk Bead	16.27	4.92	4.19

Disk Bead	13.54	7.94	3.82
Disk Bead	14.35	6.89	3.64
Disk Bead	10.40	8.21	3.07
Disk Bead	18.47	13.74	4.62
Disk Bead	19.27	11.23	4.45
Disk Bead	21.08	6.00	4.94
Disk Bead	25.72	7.23	4.87
Disk Bead	19.05	6.62	4.18
Disk Bead	23.08	1.65	4.12
Disk Bead	19.12	3.16	3.14
Disk Bead	20.28	6.13	5.17
Disk Bead	27.49	7.03	5.34
Disk Bead	20.91	8.15	6.92
Disk Bead	18.30	2.91	5.80
Disk Bead	15.32	4.29	3.75
Disk Bead	13.26	3.56	2.85
Disk Bead	13.51	2.60	3.39
Disk Bead	16.10	6.01	5.36
Disk Bead	15.46	5.98	3.55
Disk Bead	21.51	6.45	5.39
Disk Bead	23.62	3.65	3.60
Disk Bead	16.97	4.61	4.45
Disk Bead	9.58	6.57	4.11
Disk Bead	15.19	3.69	3.61
Disk Bead	16.10	5.89	4.09
Disk Bead	15.12	6.55	6.08
Disk Bead	11.73	3.71	3.56
Disk Bead	16.44	3.38	3.99
Disk Bead	17.84	4.99	4.84
Disk Bead	14.38	6.57	4.29
Disk Bead	14.29	4.31	4.00
Disk Bead	18.97	5.67	4.08
Disk Bead	10.49	3.18	3.08
Disk Bead	13.39	2.35	3.75
Disk Bead	13.82	5.17	4.84
Disk Bead	10.96	3.61	3.30
Disk Bead	10.53	2.62	3.51
Disk Bead	20.81	10.34	4.90
Disk Bead	23.81	7.72	4.24
Disk Bead	24.90	12.96	5.03
Disk Bead	21.30	4.89	3.51
Disk Bead	17.61	2.96	4.28
Disk Bead	18.59	3.82	3.79
Disk Bead	20.03	8.28	5.31
Disk Bead	21.31	4.13	5.15
Disk Bead	13.76	7.96	4.33

Disk Bead	12.70	4.45	3.07
Disk Bead	13.40	2.73	3.08
Disk Bead	11.70	4.27	5.07
Disk Bead	13.73	5.81	3.99
Disk Bead	14.07	4.75	3.85
Disk Bead	13.76	3.79	3.95
Disk Bead	13.40	2.28	3.42
Disk Bead	11.49	2.80	3.94
Disk Bead	21.47	6.74	4.85
Disk Bead	24.37	6.24	4.85
Disk Bead	19.18	4.18	4.78
Disk Bead	19.35	8.60	3.38
Disk Bead	17.47	4.24	3.22
Disk Bead	20.38	6.09	6.58
Disk Bead	18.16	7.90	4.99
Disk Bead	20.47	4.48	5.76
Disk Bead	17.51	3.69	4.36
Disk Bead	18.48	5.34	4.03
Disk Bead	15.41	6.80	5.00
Disk Bead	15.71	3.32	4.63
Disk Bead	14.73	7.67	5.20
Disk Bead	13.96	2.94	3.35
Disk Bead	13.78	6.48	3.99
Disk Bead	12.77	3.48	3.27
Disk Bead	14.54	3.36	3.96
Disk Bead	17.48	4.31	3.50
Disk Bead	13.62	6.34	3.85
Disk Bead	12.66	4.66	4.29
Disk Bead	14.14	3.61	4.69
Disk Bead	16.53	4.37	4.36
Disk Bead	13.08	3.83	3.47
Disk Bead	11.21	2.60	2.26
Disk Bead	11.25	3.15	2.47
Disk Bead	9.68	5.52	4.19
Disk Bead	10.94	3.06	3.32
Disk Bead	10.93	3.27	3.65
Disk Bead	45.43	5.52	3.73
Disk Bead	22.68	11.94	4.96
Disk Bead	17.51	8.92	4.75
Disk Bead	23.37	4.24	4.99
Disk Bead	15.12	8.13	4.78
Disk Bead	13.44	5.28	3.77
Disk Bead	14.52	3.17	3.91
Disk Bead	15.47	4.21	4.34
Disk Bead	10.46	4.48	5.24
Disk Bead	13.71	3.02	3.87

Disk Bead	12.70	4.45	3.07
Disk Bead	13.40	2.73	3.08
Disk Bead	11.70	4.27	5.07
Disk Bead	13.73	5.81	3.99
Disk Bead	14.07	4.75	3.85
Disk Bead	13.76	3.79	3.95
Disk Bead	13.40	2.28	3.42
Disk Bead	11.49	2.80	3.94
Disk Bead	21.47	6.74	4.85
Disk Bead	24.37	6.24	4.85
Disk Bead	19.18	4.18	4.78
Disk Bead	19.35	8.60	3.38
Disk Bead	17.47	4.24	3.22
Disk Bead	20.38	6.09	6.58
Disk Bead	18.16	7.90	4.99
Disk Bead	20.47	4.48	5.76
Disk Bead	17.51	3.69	4.36
Disk Bead	18.48	5.34	4.03
Disk Bead	15.41	6.80	5.00
Disk Bead	15.71	3.32	4.63
Disk Bead	14.73	7.67	5.20
Disk Bead	13.96	2.94	3.35
Disk Bead	13.78	6.48	3.99
Disk Bead	12.77	3.48	3.27
Disk Bead	14.54	3.36	3.96
Disk Bead	17.48	4.31	3.50
Disk Bead	13.62	6.34	3.85
Disk Bead	12.66	4.66	4.29
Disk Bead	14.14	3.61	4.69
Disk Bead	16.53	4.37	4.36
Disk Bead	13.08	3.83	3.47
Disk Bead	11.21	2.60	2.26
Disk Bead	11.25	3.15	2.47
Disk Bead	9.68	5.52	4.19
Disk Bead	10.94	3.06	3.32
Disk Bead	10.93	3.27	3.65
Disk Bead	45.43	5.52	3.73
Disk Bead	22.68	11.94	4.96
Disk Bead	17.51	8.92	4.75
Disk Bead	23.37	4.24	4.99
Disk Bead	15.12	8.13	4.78
Disk Bead	13.44	5.28	3.77
Disk Bead	14.52	3.17	3.91
Disk Bead	15.47	4.21	4.34
Disk Bead	10.46	4.48	5.24
Disk Bead	13.71	3.02	3.87

Disk Bead	13.12	2.59	4.40
Disk Bead	12.54	4.88	3.43
Disk Bead	20.42	4.27	3.77
Disk Bead	24.71	4.50	3.68
Disk Bead	19.02	5.00	5.62
Disk Bead	15.50	5.68	4.90
Disk Bead	13.72	6.56	5.40
Disk Bead	15.92	5.03	5.00
Disk Bead	12.86	5.29	4.52
Disk Bead	11.00	4.07	3.45
Disk Bead	17.15	3.08	3.50
Disk Bead	14.23	3.41	3.83
Disk Bead	11.38	3.15	3.39
Disk Bead	14.82	3.74	3.48
Disk Bead	12.04	5.01	3.71
Disk Bead	13.72	2.77	4.01
Disk Bead	11.49	2.65	3.82
Disk Bead	37.02	5.50	4.27
Disk Bead	23.35	4.68	3.27
Disk Bead	31.95	6.45	4.02
Disk Bead	23.78	3.25	3.44
Disk Bead	14.73	6.93	4.26
Disk Bead	16.04	4.52	3.82
Disk Bead	16.87	3.59	4.10
Disk Bead	13.55	3.71	3.96
Disk Bead	19.00	4.07	3.50
Disk Bead	14.52	5.18	4.31
Disk Bead	14.49	2.30	3.24
Disk Bead	13.90	7.19	4.74
Disk Bead	17.78	6.08	7.43
Disk Bead	12.75	2.23	3.53
Disk Bead	42.53	9.12	6.01
Disk Bead	27.42	3.64	4.76
Disk Bead	21.86	6.60	4.98
Disk Bead	13.99	5.74	4.12
Disk Bead	21.05	2.54	3.49
Disk Bead	17.57	4.27	4.80
Disk Bead	17.10	2.31	3.20
Disk Bead	16.02	5.59	4.79
Disk Bead	15.47	4.04	4.48
Disk Bead	13.49	5.06	3.57
Disk Bead	12.58	3.16	4.21
Disk Bead	14.39	3.34	3.92
Disk Bead	14.69	3.00	5.71
Disk Bead	12.31	4.78	4.53
Disk Bead	16.45	3.27	4.12

Disk Bead	12.42	3.24	4.77
Disk Bead	10.46	4.63	3.77
Disk Bead	21.09	5.22	2.90
Disk Bead	14.80	8.95	4.20
Disk Bead	17.20	2.65	3.42
Disk Bead	18.63	7.50	4.42
Disk Bead	11.57	7.77	4.40
Disk Bead	13.39	2.85	3.44
Disk Bead	15.27	6.27	4.04
Disk Bead	11.59	4.82	4.33
Disk Bead	17.63	4.03	3.95
Disk Bead	9.82	4.04	3.56
Disk Bead	14.23	5.65	3.42
Disk Bead	12.83	5.33	4.54
Disk Bead	12.80	6.04	4.51
Disk Bead	12.00	2.41	3.71
Disk Bead	11.03	6.05	3.38
Disk Bead	11.70	5.05	4.26
Disk Bead	10.73	3.45	4.99
Disk Bead	15.23	2.78	3.61
Disk Bead	11.26	4.91	3.79
Disk Bead	14.35	3.05	2.99
Disk Bead	14.98	4.52	3.89
Disk Bead	16.98	4.08	4.83
Disk Bead	15.36	2.35	3.20
Disk Bead	13.05	5.19	6.04
Disk Bead	12.67	4.01	3.88
Disk Bead	13.13	4.60	4.41
Disk Bead	11.94	2.85	3.39
Disk Bead	11.96	3.04	3.37
Disk Bead	9.37	3.28	3.61
Disk Bead	22.08	2.53	3.98
Disk Bead	20.45	8.90	4.92
Disk Bead	17.72	4.49	3.53
Disk Bead	19.61	4.46	3.92
Disk Bead	10.65	4.91	2.78
Disk Bead	13.37	8.11	4.71
Disk Bead	14.55	4.27	4.08
Disk Bead	25.83	3.10	3.16
Disk Bead	10.42	3.53	3.30
Disk Bead	14.79	3.09	4.09
Disk Bead	11.59	1.87	2.73
Disk Bead	12.65	4.08	5.60
Disk Bead	14.72	2.93	3.76
Disk Bead	9.52	4.08	3.95
Disk Bead	9.43	3.90	3.75

Disk Bead	18.22	3.81	4.23
Disk Bead	11.17	2.95	3.02
Disk Bead	12.48	3.71	4.37
Disk Bead	12.99	3.47	4.23
Disk Bead	10.66	4.53	3.35
Disk Bead	13.39	3.88	3.66
Disk Bead	9.29	3.23	4.10
Disk Bead	39.37	9.87	5.40
Disk Bead	18.08	3.40	3.82
Disk Bead	13.90	4.48	3.03
Disk Bead	22.11	3.04	4.69
Disk Bead	21.07	5.53	3.76
Disk Bead	27.04	4.91	4.51
Disk Bead	17.85	2.24	3.14
Disk Bead	18.84	8.08	4.08
Disk Bead	24.51	7.85	6.42
Disk Bead	21.99	8.00	5.06
Disk Bead	15.41	5.24	4.37
Disk Bead	22.02	5.34	6.07
Disk Bead	16.58	8.95	3.08
Disk Bead	13.66	5.95	4.67
Disk Bead	11.87	4.28	3.75
Disk Bead	17.70	6.17	2.93
Disk Bead	10.65	5.33	3.76
Disk Bead	13.06	2.37	4.19
Disk Bead	11.79	2.18	2.24
Disk Bead	10.24	2.65	3.22
Disk Bead	9.89	4.94	4.18
Disk Bead	32.98	7.37	6.87
Disk Bead	33.81	5.95	6.05
Disk Bead	19.69	5.57	4.00
Disk Bead	25.11	8.74	6.59
Disk Bead	13.61	3.31	2.98
Disk Bead	16.62	7.11	5.30
Disk Bead	13.83	7.00	5.17
Disk Bead	13.83	3.08	3.94
Disk Bead	9.62	3.38	2.89
Disk Bead	15.63	4.28	4.79
Disk Bead	13.87	2.66	3.39
Disk Bead	23.43	5.04	5.61
Disk Bead	12.17	4.25	4.94
Disk Bead	10.63	4.37	4.85
Disk Bead	9.98	2.58	2.80
Disk Bead	9.28	3.84	3.70
Disk Bead	11.01	2.78	3.39
Disk Bead	10.99	3.00	4.86

Disk Bead	13.88	3.64	3.78
Disk Bead	12.01	4.22	5.06
Disk Bead	11.55	3.67	4.63
Disk Bead	11.43	1.98	2.43
Disk Bead	12.44	3.69	4.94
Disk Bead	19.65	9.48	4.81
Disk Bead	27.61	4.95	4.74
Disk Bead	25.52	5.47	4.99
Disk Bead	26.42	5.35	5.05
Disk Bead	18.91	5.41	4.15
Disk Bead	14.41	6.52	3.64
Disk Bead	15.05	5.20	3.37
Disk Bead	13.99	3.48	4.92
Disk Bead	15.41	6.65	5.17
Disk Bead	10.13	6.06	2.92
Disk Bead	16.10	4.71	4.63
Disk Bead	12.73	4.26	3.36
Disk Bead	10.91	4.10	3.74
Disk Bead	11.51	4.92	3.67
Disk Bead	12.87	3.73	4.10
Disk Bead	10.69	5.56	3.76
Disk Bead	17.20	5.10	4.15
Disk Bead	14.95	4.87	3.72
Disk Bead	14.74	4.64	3.36
Disk Bead	13.96	6.27	3.96
Disk Bead	10.38	3.10	4.09
Disk Bead	9.53	4.35	3.53
Disk Bead	8.91	2.30	3.10
Disk Bead	13.42	2.32	3.19
Disk Bead	12.47	3.51	3.46
Disk Bead	8.11	4.19	2.59
Disk Bead	10.75	3.01	3.78
Disk Bead	14.20	3.44	4.30
Disk Bead	9.47	3.86	3.10
Disk Bead	10.11	2.49	2.19
Disk Bead	10.91	3.57	3.91
Disk Bead	10.69	2.71	2.78
Disk Bead	27.89	3.32	2.48
Disk Bead	23.61	8.84	4.26
Disk Bead	25.13	9.69	6.07
Disk Bead	21.17	6.72	3.72
Disk Bead	18.36	4.67	4.97
Disk Bead	15.61	6.49	4.15
Disk Bead	20.08	6.31	5.09
Disk Bead	24.36	3.77	5.19
Disk Bead	22.87	3.02	4.00

Disk Bead	21.87	3.48	3.66
Disk Bead	20.54	8.36	3.43
Disk Bead	17.66	7.54	4.00
Disk Bead	18.16	2.94	3.05
Disk Bead	17.73	2.06	3.83
Disk Bead	18.62	4.37	3.71
Disk Bead	19.81	4.89	3.33
Disk Bead	14.61	5.01	4.35
Disk Bead	20.37	8.49	6.94
Disk Bead	20.39	4.47	5.08
Disk Bead	17.35	5.37	3.41
Disk Bead	19.50	3.75	3.67
Disk Bead	14.73	5.61	3.80
Disk Bead	15.91	4.69	5.02
Disk Bead	14.00	5.93	4.25
Disk Bead	14.65	3.39	3.61
Disk Bead	14.64	5.17	4.08
Disk Bead	19.79	5.77	3.43
Disk Bead	10.10	6.96	3.76
Disk Bead	12.98	4.62	4.94
Disk Bead	13.64	3.13	3.44
Disk Bead	13.81	5.15	3.94
Disk Bead	11.32	4.11	3.33
Disk Bead	13.25	5.28	3.92
Disk Bead	14.18	3.17	3.47
Disk Bead	11.60	2.60	2.64
Disk Bead	11.35	3.55	4.31
Disk Bead	9.98	3.29	3.88
Disk Bead	11.91	5.07	3.58
Disk Bead	10.72	3.39	3.62
Disk Bead	8.50	2.91	2.96
Disk Bead	10.28	3.02	3.41
Disk Bead	12.14	2.39	2.78
Disk Bead	9.58	3.13	2.93
Disk Bead	14.57	2.94	3.61
Disk Bead	9.85	3.40	3.92
Disk Bead	11.62	2.10	2.90
Disk Bead	11.70	3.24	3.80
Disk Bead	9.93	3.76	5.62
Disk Bead	8.96	1.93	3.24
Disk Bead	9.68	2.40	2.90
Disk Bead	8.67	2.58	2.87
Disk Bead	8.15	2.83	3.18
Disk Bead	11.41	4.03	4.64
Disk Bead	11.98	3.05	3.86
Disk Bead	10.18	3.31	2.82

Disk Bead	8.20	2.48	3.89
Disk Bead	9.51	3.37	3.66
Disk Bead	8.07	3.53	2.60
Disk Bead	9.29	2.10	2.30
Disk Bead	10.23	1.96	3.23
Disk Bead	43.56	2.91	3.52
Disk Bead	25.15	2.87	2.99
Disk Bead	22.86	8.26	7.45
Disk Bead	18.35	7.03	3.84
Disk Bead	17.11	7.44	4.27
Disk Bead	18.98	3.77	4.59
Disk Bead	14.08	6.26	4.74
Disk Bead	15.63	8.48	4.43
Disk Bead	14.63	9.41	4.21
Disk Bead	14.75	6.78	5.20
Disk Bead	12.59	2.96	2.95
Disk Bead	19.31	6.20	3.16
Disk Bead	12.49	3.41	2.78
Disk Bead	13.34	4.97	4.21
Disk Bead	13.99	4.38	3.81
Disk Bead	11.45	2.85	3.78
Disk Bead	12.12	2.11	2.75
Disk Bead	11.45	4.68	3.25
Disk Bead	11.47	2.76	3.26
Disk Bead	11.03	5.58	3.99
Disk Bead	11.43	3.18	4.00
Disk Bead	11.02	2.87	4.27
Disk Bead	20.52	2.84	4.23
Disk Bead	13.28	4.82	4.92
Disk Bead	16.08	5.32	4.05
Disk Bead	15.65	4.24	3.41
Disk Bead	17.50	8.13	3.67
Disk Bead	12.32	4.29	3.86
Disk Bead	12.27	2.92	3.48
Disk Bead	10.89	5.92	3.41
Disk Bead	13.91	3.66	3.12
Disk Bead	15.24	3.65	3.45
Disk Bead	18.39	2.63	3.32
Disk Bead	11.27	4.88	3.75
Disk Bead	10.97	4.38	4.29
Disk Bead	14.57	3.84	3.17
Disk Bead	10.21	3.78	3.54
Disk Bead	12.46	4.65	5.34
Disk Bead	10.42	3.51	4.65
Disk Bead	11.47	2.53	3.18
Disk Bead	10.82	2.68	2.98

Disk Bead	10.42	3.72	3.32
Disk Bead	13.71	3.91	3.30
Disk Bead	9.27	4.62	3.53
Disk Bead	11.30	2.32	3.08
Disk Bead	12.77	3.92	3.34
Disk Bead	9.66	2.63	2.69
Disk Bead	9.80	4.31	3.09
Disk Bead	10.01	3.15	2.96
Disk Bead	11.75	3.09	4.02
Disk Bead	9.66	4.81	3.11
Disk Bead	8.61	4.22	3.54
Disk Bead	8.38	3.17	3.31
Disk Bead	8.82	3.24	2.79
Disk Bead	8.27	2.22	2.90
Disk Bead	10.67	3.18	3.01
Disk Bead	7.92	3.34	2.90
Disk Bead	22.83	4.32	3.36
Disk Bead	21.72	11.15	3.78
Disk Bead	16.96	2.47	3.26
Disk Bead	18.26	6.30	5.52
Disk Bead	15.54	4.67	6.67
Disk Bead	14.02	4.14	3.23
Disk Bead	15.31	3.28	2.72
Disk Bead	12.32	3.70	3.62
Disk Bead	10.12	5.79	4.27
Disk Bead	17.50	6.56	4.45
Disk Bead	13.37	5.52	3.17
Disk Bead	15.17	6.67	3.37
Disk Bead	13.44	3.66	3.98
Disk Bead	15.83	3.92	3.06
Disk Bead	14.02	2.75	3.59
Disk Bead	12.03	3.63	3.81
Disk Bead	10.57	2.77	3.27
Disk Bead	13.16	4.66	3.29
Disk Bead	12.73	3.98	2.92
Disk Bead	13.43	3.33	3.48
Disk Bead	11.98	2.70	2.90
Disk Bead	18.83	2.58	3.67
Disk Bead	16.05	3.75	3.25
Disk Bead	12.16	5.16	3.42
Disk Bead	10.07	3.85	4.03
Disk Bead	10.50	5.39	3.37
Disk Bead	9.73	2.09	2.83
Disk Bead	9.57	3.49	3.98
Disk Bead	15.07	6.52	4.05
Disk Bead	13.42	3.55	2.80

Disk Bead	10.56	7.06	4.62
Disk Bead	12.75	2.89	3.55
Disk Bead	7.41	3.33	3.72
Disk Bead	13.38	5.38	4.94
Disk Bead	11.37	2.75	5.09
Disk Bead	5.33	2.71	3.89
Disk Bead	7.57	3.10	3.34
Disk Bead	8.46	3.26	3.45
Disk Bead	8.91	3.65	3.48
Disk Bead	23.09	3.29	2.87
Disk Bead	20.48	9.59	5.17
Disk Bead	19.87	4.44	3.00
Disk Bead	13.85	5.57	4.41
Disk Bead	10.79	3.90	3.71
Disk Bead	13.13	6.97	3.87
Disk Bead	20.48	9.87	4.20
Disk Bead	17.34	6.77	6.11
Disk Bead	15.66	6.08	4.02
Disk Bead	16.44	7.18	3.99
Disk Bead	14.01	2.75	3.16
Disk Bead	12.21	2.91	2.83
Disk Bead	13.18	4.93	4.56
Disk Bead	16.01	5.73	3.98
Disk Bead	11.25	4.41	4.28
Disk Bead	12.64	3.67	3.28
Disk Bead	13.01	2.51	3.13
Disk Bead	11.30	8.75	4.89
Disk Bead	13.28	4.44	3.81
Disk Bead	13.86	4.87	4.30
Disk Bead	15.34	2.71	4.00
Disk Bead	14.66	5.53	4.16
Disk Bead	11.24	6.04	4.35
Disk Bead	12.08	4.69	3.34
Disk Bead	11.20	3.25	3.61
Disk Bead	11.61	3.38	3.55
Disk Bead	13.46	4.14	5.40
Disk Bead	13.42	3.70	3.31
Disk Bead	12.77	4.24	3.98
Disk Bead	12.51	6.24	3.42
Disk Bead	12.47	2.39	3.08
Disk Bead	14.05	3.50	3.62
Disk Bead	11.82	3.97	3.67
Disk Bead	10.56	4.76	2.25
Disk Bead	9.67	1.64	3.17
Disk Bead	13.29	2.85	3.19
Disk Bead	10.06	2.85	3.19

Disk Bead	8.21	4.86	3.03
Disk Bead	9.03	2.76	3.74
Disk Bead	9.62	2.23	3.04
Disk Bead	8.66	3.84	3.01
Disk Bead	7.16	5.31	3.63
Disk Bead	12.77	4.96	5.31
Disk Bead	10.38	3.68	3.62
Disk Bead	10.11	2.46	2.88
Disk Bead	9.50	3.24	3.19
Disk Bead	8.75	3.03	2.76
Disk Bead	17.01	3.46	3.55
Disk Bead	14.06	3.55	5.10
Disk Bead	23.05	6.95	3.87
Disk Bead	22.05	5.70	4.75
Disk Bead	9.30	3.02	2.84
Disk Bead	9.49	2.45	2.72
Disk Bead	14.25	6.40	3.79
Disk Bead	21.58	4.69	3.37
Disk Bead	14.13	3.56	4.37
Disk Bead	16.29	4.79	3.58
Disk Bead	11.55	2.41	2.98
Disk Bead	18.73	4.83	3.65
Disk Bead	14.95	4.98	3.71
Disk Bead	14.81	4.40	5.45
Disk Bead	15.05	5.05	3.93
Disk Bead	10.82	4.41	4.61
Disk Bead	13.43	4.99	4.30
Disk Bead	13.18	3.37	3.57
Disk Bead	14.36	4.63	2.80
Disk Bead	12.27	3.89	4.23
Disk Bead	9.66	2.06	2.52
Disk Bead	13.98	5.25	3.83
Disk Bead	12.11	4.58	2.51
Disk Bead	13.81	4.68	4.72
Disk Bead	13.62	4.73	4.25
Disk Bead	12.32	3.28	3.79
Disk Bead	14.00	5.47	5.25
Disk Bead	13.30	4.00	3.35
Disk Bead	9.77	2.71	4.75
Disk Bead	8.36	2.71	3.94
Disk Bead	9.73	4.53	2.97
Disk Bead	22.96	4.23	3.65
Disk Bead	24.00	9.20	5.24
Disk Bead	28.16	2.62	4.64
Disk Bead	10.69	5.19	3.81
Disk Bead	14.46	3.00	3.07

Disk Bead	15.41	4.83	4.61
Disk Bead	14.03	6.09	3.52
Disk Bead	11.42	6.04	4.49
Disk Bead	15.93	2.69	4.06
Disk Bead	9.77	7.35	3.75
Disk Bead	14.23	4.36	2.37
Disk Bead	12.22	5.61	3.25
Disk Bead	17.22	5.37	4.41
Disk Bead	12.80	4.34	4.64
Disk Bead	10.60	4.40	3.41
Disk Bead	11.72	3.62	4.85
Disk Bead	11.28	3.03	4.50
Disk Bead	10.02	3.97	3.10
Disk Bead	10.48	3.01	3.53
Disk Bead	11.37	2.20	3.23
Disk Bead	12.92	2.82	3.12
Disk Bead	12.97	2.84	3.44
Disk Bead	10.15	4.46	4.00
Disk Bead	10.90	3.35	3.31
Disk Bead	13.43	1.88	2.48
Disk Bead	12.43	3.17	3.26
Disk Bead	9.04	3.27	2.95
Disk Bead	7.22	2.95	3.66
Disk Bead	10.38	2.82	3.51
Disk Bead	16.60	5.27	4.39
Disk Bead	15.44	4.43	3.93
Disk Bead	8.77	2.09	2.41
Disk Bead	14.43	4.42	4.15
Disk Bead	8.67	4.49	4.41
Disk Bead	13.54	3.59	3.32
Disk Bead	11.87	3.65	4.24
Disk Bead	12.26	3.24	2.67
Disk Bead	12.53	6.02	5.03
Disk Bead	8.29	4.19	3.66
Disk Bead	12.71	5.06	3.30
Disk Bead	4.07	3.90	3.60
Disk Bead	14.07	4.52	4.09
Disk Bead	17.16	4.90	4.31
AVERAGES (mm)	**14.44**	**4.40**	**3.90**

Broken or incomplete beads were not measured and are not included in these size averages
Total beads 955

Table A.8 Wislon Mound Bundle #42 Disk Beads

Artifact Type	Length (mm)	Thickness (mm)	Drill Hole Diameter (mm)
Disk Bead	21.31	7.68	6.75
Disk Bead	18.11	5.67	4.49
Disk Bead	14.42	3.59	5.61
Disk Bead	26.27	6.56	4.79
Disk Bead	17.13	5.00	3.59
Disk Bead	21.10	5.78	5.26
Disk Bead	16.88	3.99	3.67
Disk Bead	23.00	3.47	3.22
Disk Bead	18.02	5.44	5.59
Disk Bead	14.01	7.41	4.48
Disk Bead	17.81	5.70	4.16
Disk Bead	15.06	4.80	4.63
Disk Bead	17.32	3.81	4.26
Disk Bead	16.33	2.70	4.03
Disk Bead	15.26	3.81	4.71
Disk Bead	16.30	2.62	2.92
Disk Bead	17.55	8.50	3.90
Disk Bead	15.56	7.91	6.70
Disk Bead	21.88	4.57	4.15
Disk Bead	15.84	7.80	3.90
Disk Bead	29.66	8.90	3.83
Disk Bead	21.20	4.52	4.10
Disk Bead	21.31	7.30	5.43
Disk Bead	22.80	9.36	3.93
Disk Bead	20.92	3.58	4.61
Disk Bead	17.38	5.68	4.10
Disk Bead	19.03	4.60	4.23
Disk Bead	20.71	4.08	4.38
Disk Bead	29.72	5.93	3.50
Disk Bead	24.91	3.87	5.39
Disk Bead	28.38	5.08	6.84
Disk Bead	16.35	3.91	3.74
Disk Bead	26.84	3.39	3.80
Disk Bead	21.10	5.74	3.98
Disk Bead	18.70	5.53	3.11
Disk Bead	20.10	3.74	6.16
Disk Bead	24.26	3.97	4.15
Disk Bead	13.33	5.43	2.94
Disk Bead	16.73	6.24	5.19
Disk Bead	9.39	4.95	4.47
Disk Bead	15.05	3.85	3.18
Disk Bead	13.12	2.01	3.73
Disk Bead	15.21	6.93	3.79
Disk Bead	21.62	2.84	3.98
Disk Bead	23.95	5.69	5.35
Disk Bead	13.88	4.44	3.91

Disk Bead	21.60	3.54	4.03
Disk Bead	13.51	4.96	5.13
Disk Bead	15.93	2.79	3.71
Disk Bead	17.80	3.78	4.57
Disk Bead	16.08	3.66	4.67
Disk Bead	13.94	5.03	5.07
Disk Bead	10.29	4.19	4.12
Disk Bead	9.75	2.90	3.00
Disk Bead	11.36	6.67	3.95
Disk Bead	9.50	5.29	2.92
Disk Bead	8.82	3.41	3.77
Disk Bead	24.53	9.13	2.94
Disk Bead	30.11	5.48	5.73
Disk Bead	27.82	4.92	3.74
Disk Bead	33.79	3.91	4.88
Disk Bead	23.23	6.87	8.13
Disk Bead	20.19	3.60	3.41
Disk Bead	15.44	3.83	3.80
Disk Bead	18.99	4.86	5.51
Disk Bead	21.81	5.71	5.06
Disk Bead	20.29	6.65	4.86
Disk Bead	16.64	3.64	4.03
Disk Bead	13.99	4.88	5.98
Disk Bead	16.51	2.98	3.09
Disk Bead	13.72	4.74	4.15
Disk Bead	12.53	3.06	3.52
Disk Bead	22.91	7.51	6.25
Disk Bead	23.69	6.59	4.90
Disk Bead	32.01	4.31	5.65
Disk Bead	23.52	5.70	4.98
Disk Bead	26.02	4.68	4.13
Disk Bead	20.90	3.73	3.52
Disk Bead	21.92	3.64	4.05
Disk Bead	14.85	4.84	4.13
Disk Bead	20.45	7.86	5.26
Disk Bead	24.44	4.58	4.88
Disk Bead	21.76	3.71	4.45
Disk Bead	16.45	4.18	4.19
Disk Bead	13.21	4.65	3.60
Disk Bead	16.61	5.42	6.75
Disk Bead	22.41	6.01	4.89
Disk Bead	26.72	3.29	3.48
Disk Bead	17.41	4.18	4.50
Disk Bead	23.61	4.51	3.88
Disk Bead	16.58	5.86	4.69
Disk Bead	21.92	3.69	4.11
Disk Bead	13.94	2.73	3.17
Disk Bead	15.94	4.17	4.33

Disk Bead	14.43	5.17	3.97
Disk Bead	12.99	3.72	3.45
Disk Bead	9.74	2.28	3.60
Disk Bead	14.75	2.74	3.10
Disk Bead	14.66	3.94	4.47
Disk Bead	8.64	2.59	3.84
Disk Bead	11.42	2.68	3.63
Disk Bead	16.03	5.85	7.85
Disk Bead	9.32	3.18	3.87
Disk Bead	16.81	3.86	4.56
Disk Bead	11.32	5.42	3.95
Disk Bead	14.18	3.48	3.66
Disk Bead	10.88	3.38	3.77
Disk Bead	13.30	5.83	3.69
Disk Bead	31.50	7.54	4.62
Disk Bead	17.16	5.86	6.73
Disk Bead	18.62	4.02	4.92
Disk Bead	20.25	4.33	4.92
Disk Bead	19.82	5.74	4.82
Disk Bead	16.20	3.88	6.90
Disk Bead	22.68	4.64	4.03
Disk Bead	20.81	9.41	4.01
Disk Bead	15.81	2.82	3.83
Disk Bead	16.61	3.60	4.12
Disk Bead	15.93	4.22	4.02
Disk Bead	23.57	5.90	4.17
Disk Bead	16.31	4.26	4.44
Disk Bead	17.35	6.07	5.54
Disk Bead	17.27	5.55	4.89
Disk Bead	22.70	4.91	4.48
Disk Bead	14.26	5.46	5.22
Disk Bead	19.92	3.01	3.52
Disk Bead	16.93	2.44	3.35
Disk Bead	21.63	3.69	4.19
Disk Bead	35.61	5.25	4.54
Disk Bead	25.34	6.32	6.14
Disk Bead	23.72	8.26	5.22
Disk Bead	22.49	4.46	4.11
Disk Bead	26.34	4.51	3.35
Disk Bead	22.09	4.78	4.44
Disk Bead	16.42	3.48	4.29
Disk Bead	12.48	5.48	4.95
Disk Bead	41.66	8.65	4.77
Disk Bead	22.68	7.65	5.17
Disk Bead	16.68	7.92	5.93
Disk Bead	14.79	5.30	4.05
Disk Bead	28.59	8.94	7.00
Disk Bead	20.20	5.61	4.24

Disk Bead	19.76	4.15	4.12
Disk Bead	17.05	7.84	4.53
Disk Bead	16.77	6.24	3.87
Disk Bead	20.58	4.87	4.24
Disk Bead	13.81	5.56	4.12
Disk Bead	14.41	5.57	4.94
Disk Bead	19.58	5.26	4.15
Disk Bead	16.95	6.06	4.33
Disk Bead	14.40	5.51	4.95
Disk Bead	14.29	2.89	4.74
Disk Bead	14.54	5.15	4.60
Disk Bead	18.13	3.18	3.64
Disk Bead	13.57	2.70	4.37
Disk Bead	15.13	2.42	3.30
Disk Bead	13.45	2.88	3.62
Disk Bead	9.73	3.24	3.60
Disk Bead	13.92	4.24	3.51
Disk Bead	8.72	4.18	4.60
Disk Bead	8.64	3.78	4.20
Disk Bead	12.87	2.75	4.33
Disk Bead	9.80	2.45	2.37
Disk Bead	32.06	2.84	4.49
Disk Bead	17.75	3.12	3.86
Disk Bead	18.16	3.67	3.45
Disk Bead	17.54	4.79	5.64
Disk Bead	23.82	3.56	4.69
Disk Bead	25.03	6.41	4.88
Disk Bead	20.44	5.02	4.71
Disk Bead	22.18	5.32	4.54
Disk Bead	20.32	6.29	3.75
Disk Bead	24.81	4.43	4.06
Disk Bead	21.77	4.56	4.05
Disk Bead	16.57	3.70	3.27
Disk Bead	17.11	7.70	3.88
Disk Bead	14.60	3.63	3.94
Disk Bead	11.50	5.16	3.64
Disk Bead	15.88	4.06	3.73
Disk Bead	15.71	3.79	3.55
Disk Bead	18.77	4.18	5.54
Disk Bead	30.94	3.43	3.62
Disk Bead	16.20	3.96	4.59
Disk Bead	16.28	3.89	5.65
Disk Bead	12.57	4.04	3.51
Disk Bead	12.81	4.03	4.24
Disk Bead	15.92	5.24	4.73
Disk Bead	16.70	4.44	3.47
Disk Bead	14.66	4.16	9.18
Disk Bead	9.64	2.72	2.98

Disk Bead	9.97	3.27	3.57
Disk Bead	11.91	3.10	4.19
Disk Bead	24.85	5.03	3.91
Disk Bead	23.39	2.63	5.62
Disk Bead	13.78	3.39	4.17
Disk Bead	19.97	4.44	3.95
Disk Bead	30.03	1.71	3.68
Disk Bead	14.40	3.37	3.45
Disk Bead	13.85	1.66	3.46
Disk Bead	10.38	2.74	4.60
Disk Bead	11.00	4.20	3.11
Disk Bead	31.92	3.37	4.17
Disk Bead	23.92	5.17	3.84
Disk Bead	22.41	3.64	4.58
Disk Bead	30.21	3.25	3.83
Disk Bead	22.20	3.45	3.71
Disk Bead	22.55	4.59	4.35
Disk Bead	20.37	5.92	4.62
Disk Bead	19.72	4.04	4.46
Disk Bead	18.90	4.08	3.40
Disk Bead	23.07	3.27	3.83
Disk Bead	9.79	6.41	4.06
Disk Bead	18.86	4.91	5.25
Disk Bead	18.39	5.16	5.22
Disk Bead	12.31	4.17	5.73
Disk Bead	18.26	4.96	5.73
Disk Bead	14.02	4.92	4.19
Disk Bead	14.21	6.85	4.74
Disk Bead	21.09	6.46	5.71
Disk Bead	34.43	4.51	4.92
Disk Bead	23.53	4.66	3.65
Disk Bead	31.92	12.56	4.55
Disk Bead	15.06	8.86	4.68
Disk Bead	20.50	8.82	4.81
Disk Bead	21.36	4.87	3.91
Disk Bead	26.26	7.67	4.85
Disk Bead	202.00	5.68	4.11
Disk Bead	22.68	4.25	3.87
Disk Bead	18.89	9.74	5.99
Disk Bead	20.57	7.51	5.04
Disk Bead	21.86	10.26	3.99
Disk Bead	20.93	5.63	4.05
Disk Bead	18.10	5.17	3.80
Disk Bead	14.47	5.30	4.29
Disk Bead	10.08	5.68	5.99
Disk Bead	15.47	6.08	3.72
Disk Bead	15.47	5.05	3.80
Disk Bead	21.98	3.41	4.38

Disk Bead	15.14	3.20	3.83
Disk Bead	14.98	4.23	3.76
Disk Bead	11.19	3.93	3.66
Disk Bead	15.84	2.74	3.82
Disk Bead	16.65	4.57	4.29
Disk Bead	15.24	4.90	4.13
Disk Bead	9.34	3.65	3.54
Disk Bead	19.08	3.60	3.86
Disk Bead	12.49	3.57	3.36
Disk Bead	13.37	4.25	5.98
Disk Bead	11.17	3.58	3.11
Disk Bead	13.98	2.98	3.28
Disk Bead	12.32	4.51	4.48
Disk Bead	7.97	3.67	3.91
Disk Bead	20.20	3.99	3.45
Disk Bead	25.55	3.14	3.97
Disk Bead	20.41	4.78	3.95
Disk Bead	15.16	11.82	3.29
Disk Bead	22.39	3.66	3.25
Disk Bead	20.34	3.79	4.68
Disk Bead	18.13	3.13	4.87
Disk Bead	17.02	3.19	3.48
Disk Bead	18.00	5.02	3.05
Disk Bead	20.91	2.74	4.10
Disk Bead	14.00	5.08	4.51
Disk Bead	20.81	3.48	3.79
Disk Bead	17.51	4.36	3.66
Disk Bead	30.92	2.21	3.71
Disk Bead	15.15	3.70	3.22
Disk Bead	14.54	5.64	4.47
Disk Bead	14.21	3.47	4.17
Disk Bead	14.87	4.89	3.56
Disk Bead	23.27	5.68	3.87
Disk Bead	30.24	11.41	10.35
Disk Bead	25.09	5.67	4.30
Disk Bead	30.55	6.26	5.45
Disk Bead	23.89	4.94	5.64
Disk Bead	24.14	6.50	5.01
Disk Bead	17.45	3.79	4.18
Disk Bead	21.14	4.01	4.08
Disk Bead	23.85	9.53	3.84
Disk Bead	17.32	4.40	3.56
Disk Bead	23.39	2.31	4.45
Disk Bead	20.42	3.94	3.69
Disk Bead	20.94	4.55	3.74
Disk Bead	19.12	5.31	7.46
Disk Bead	20.41	5.38	4.77
Disk Bead	23.11	2.14	3.78

Disk Bead	20.63	4.67	6.54
Disk Bead	13.46	5.70	3.84
Disk Bead	16.59	5.13	5.11
Disk Bead	22.97	3.66	3.03
Disk Bead	19.52	3.35	3.90
Disk Bead	18.29	1.49	2.79
Disk Bead	10.59	3.66	2.66
Disk Bead	11.99	4.39	3.99
Disk Bead	15.05	3.19	3.14
Disk Bead	12.22	4.42	3.73
Disk Bead	9.76	2.40	3.60
Disk Bead	23.44	4.58	4.15
Disk Bead	24.92	4.30	4.82
Disk Bead	17.89	4.32	3.75
Disk Bead	14.46	4.35	4.73
Disk Bead	17.21	7.08	4.28
Disk Bead	17.85	7.95	6.05
Disk Bead	17.97	3.08	3.31
Disk Bead	14.88	3.71	3.84
Disk Bead	22.06	4.62	5.18
Disk Bead	15.97	3.78	3.38
Disk Bead	20.27	3.24	4.28
Disk Bead	19.29	3.06	4.22
Disk Bead	15.51	6.61	4.36
Disk Bead	14.44	4.57	3.50
Disk Bead	14.02	4.64	5.22
Disk Bead	14.43	4.40	3.65
Disk Bead	12.03	3.35	3.30
Disk Bead	12.73	4.71	4.27
Disk Bead	15.62	3.19	4.81
Disk Bead	12.40	6.26	3.94
Disk Bead	15.62	3.51	3.64
Disk Bead	15.33	4.47	5.79
Disk Bead	10.66	3.24	3.01
Disk Bead	11.53	1.42	2.32
Disk Bead	53.85	13.85	3.78
Disk Bead	28.50	5.31	5.19
Disk Bead	14.89	4.30	4.02
Disk Bead	28.23	4.49	4.21
Disk Bead	13.37	3.63	4.41
Disk Bead	21.42	2.25	2.38
Disk Bead	37.62	4.12	4.86
Disk Bead	13.54	6.19	3.74
Disk Bead	19.60	4.66	4.03
Disk Bead	39.47	5.27	4.82
Disk Bead	31.02	4.59	5.40
Disk Bead	19.60	5.50	5.38

Disk Bead	26.86	4.46	5.16
Disk Bead	29.80	2.89	4.10
Disk Bead	32.87	3.36	5.50
Disk Bead	18.06	4.59	5.20
Disk Bead	20.75	2.88	4.83
Disk Bead	8.48	2.63	3.04
Disk Bead	17.65	3.81	3.82
Disk Bead	21.60	5.79	4.90
Disk Bead	16.98	4.40	4.31
Disk Bead	14.33	5.49	5.62
Disk Bead	21.79	3.45	5.09
Disk Bead	14.30	3.61	4.34
Disk Bead	16.59	4.76	4.68
Disk Bead	17.37	5.28	5.09
Disk Bead	18.21	5.74	4.51
Disk Bead	15.48	3.35	3.89
Disk Bead	20.82	2.81	4.00
Disk Bead	19.85	3.85	3.97
Disk Bead	14.64	3.99	3.36
Disk Bead	13.65	5.03	5.11
Disk Bead	23.90	4.80	5.08
Disk Bead	19.38	6.18	6.08
Disk Bead	16.16	4.21	4.84
Disk Bead	9.74	3.26	3.70
Disk Bead	14.38	5.63	4.09
Disk Bead	11.56	3.27	3.79
Disk Bead	13.28	4.17	4.18
Disk Bead	14.31	3.27	4.03
Disk Bead	11.65	5.14	3.77
Disk Bead	9.24	2.60	4.17
Disk Bead	14.90	6.98	4.88
Disk Bead	28.14	8.18	5.86
Disk Bead	23.67	4.19	4.44
Disk Bead	32.18	2.28	3.99
Disk Bead	19.69	4.36	3.67
Disk Bead	22.30	4.18	4.58
Disk Bead	21.98	7.23	3.91
Disk Bead	23.12	4.34	4.87
Disk Bead	16.63	3.49	4.71
Disk Bead	27.53	6.67	5.73
Disk Bead	18.07	5.93	6.20
Disk Bead	21.48	4.22	5.08
Disk Bead	24.53	3.63	4.22
Disk Bead	22.23	5.74	5.08
Disk Bead	25.63	4.53	6.57
Disk Bead	22.25	3.18	4.79
Disk Bead	23.29	4.19	4.57
Disk Bead	14.77	4.69	3.87

Disk Bead	9.91	5.15	3.54
Disk Bead	20.85	2.47	4.22
Disk Bead	14.66	5.19	4.80
Disk Bead	9.83	2.99	3.13
Disk Bead	18.14	2.66	4.23
Disk Bead	12.54	1.59	3.05
Disk Bead	10.39	3.71	3.59
Disk Bead	16.63	1.49	3.00
Disk Bead	14.34	2.56	4.09
Disk Bead	19.31	3.35	3.94
Disk Bead	14.24	4.01	2.81
Disk Bead	14.75	4.03	3.68
Disk Bead	18.81	2.42	3.69
Disk Bead	10.33	1.78	2.42
Disk Bead	22.83	3.29	2.92
Disk Bead	12.82	3.59	3.80
Disk Bead	11.09	1.83	2.86
Disk Bead	18.58	3.91	5.08
Disk Bead	18.55	4.39	3.63
Disk Bead	16.35	1.88	3.18
Disk Bead	14.84	4.42	2.87
Disk Bead	16.11	4.10	3.94
Disk Bead	7.53	3.79	4.61
Disk Bead	13.25	3.62	3.16
Disk Bead	6.32	2.33	2.99
Disk Bead	10.38	3.44	3.42
Disk Bead	9.49	4.56	3.06
Disk Bead	33.43	5.14	4.60
Disk Bead	33.80	10.52	4.73
Disk Bead	28.31	4.20	4.27
Disk Bead	26.60	4.96	4.15
Disk Bead	22.62	8.60	3.47
Disk Bead	27.24	2.21	4.80
Disk Bead	25.80	3.75	5.24
Disk Bead	23.37	5.79	5.89
Disk Bead	19.15	3.64	3.72
Disk Bead	20.75	6.53	5.45
Disk Bead	30.62	6.04	4.97
Disk Bead	22.09	4.05	4.97
Disk Bead	20.08	5.32	5.66
Disk Bead	14.46	5.36	4.31
Disk Bead	19.11	6.97	4.12
Disk Bead	33.85	4.40	5.13
Disk Bead	17.21	4.35	4.21
Disk Bead	29.94	3.86	4.23
Disk Bead	21.37	5.58	3.82
Disk Bead	17.80	7.66	6.41
Disk Bead	14.50	3.72	4.31

Disk Bead	10.49	3.42	3.60
Disk Bead	16.74	2.63	3.72
Disk Bead	36.77	4.30	4.73
Disk Bead	26.21	5.20	4.56
Disk Bead	14.18	2.05	4.46
Disk Bead	17.04	3.30	4.01
Disk Bead	15.83	3.63	3.93
Disk Bead	19.16	3.95	4.56
Disk Bead	14.16	8.07	4.83
Disk Bead	35.36	6.12	4.72
Disk Bead	12.92`	4.41	6.29
Disk Bead	10.38	2.64	2.98
Disk Bead	18.99	2.50	3.44
Disk Bead	13.78	7.07	5.01
Disk Bead	8.25	2.59	4.23
Disk Bead	14.52	3.57	4.41
Disk Bead	13.92	3.49	3.73
Disk Bead	16.17	3.88	3.29
Disk Bead	15.22	2.14	3.56
Disk Bead	11.22	3.18	3.21
Disk Bead	12.28	3.52	2.10
Disk Bead	10.22	4.61	6.01
Disk Bead	9.61	3.89	3.31
Disk Bead	15.43	4.57	3.89
Disk Bead	11.31	5.37	6.08
Disk Bead	18.53	4.47	4.10
Disk Bead	21.13	5.01	5.95
Disk Bead	24.28	7.65	6.09
Disk Bead	24.21	3.62	3.55
Disk Bead	17.37	8.04	4.89
Disk Bead	17.17	6.01	5.48
Disk Bead	23.30	4.13	3.44
Disk Bead	23.48	3.97	4.71
Disk Bead	13.43	5.96	4.15
Disk Bead	14.62	3.44	4.64
Disk Bead	17.17	5.75	5.45
Disk Bead	7.55	3.71	3.82
Disk Bead	22.54	4.65	4.51
Disk Bead	15.44	3.01	4.03
Disk Bead	15.71	1.30	3.91
Disk Bead	14.20	4.15	2.92
Disk Bead	11.24	3.82	3.93
Disk Bead	14.06	1.32	3.37
Disk Bead	14.13	3.09	4.69
Disk Bead	13.43	3.47	3.20
Disk Bead	9.67	2.79	2.73
Disk Bead	9.44	5.03	3.67
Disk Bead	13.44	3.81	3.25

Disk Bead	14.24	3.38	3.08
Disk Bead	18.74	3.69	3.73
Disk Bead	11.94	5.79	4.96
Disk Bead	15.44	3.76	4.62
Disk Bead	11.43	3.54	3.87
Disk Bead	14.83	4.46	3.51
Disk Bead	10.12	2.82	2.91
Disk Bead	14.56	2.91	5.16
Disk Bead	14.53	3.73	4.30
Disk Bead	11.24	4.03	3.97
Disk Bead	11.72	4.02	5.09
Disk Bead	10.90	3.91	3.83
Disk Bead	9.38	4.06	3.49
Disk Bead	11.57	3.21	4.28
Disk Bead	10.52	3.60	3.87
Disk Bead	11.26	3.26	4.46
Disk Bead	9.19	2.85	3.68
Disk Bead	12.29	2.68	3.14
Disk Bead	8.18	3.57	3.85
Disk Bead	9.26	2.94	3.43
Disk Bead	6.97	2.78	2.07
Disk Bead	18.00	7.10	3.93
Disk Bead	20.26	5.12	5.45
Disk Bead	13.92	3.37	3.12
Disk Bead	16.61	5.14	3.95
Disk Bead	17.42	2.84	3.45
Disk Bead	14.91	2.96	3.60
Disk Bead	17.23	5.66	3.79
Disk Bead	12.18	3.25	4.31
Disk Bead	13.28	3.10	4.24
Disk Bead	10.08	3.97	4.68
Disk Bead	9.07	4.58	3.38
Disk Bead	8.34	3.81	3.04
Disk Bead	6.61	2.83	2.45
Disk Bead	20.01	6.86	3.73
Disk Bead	20.97	2.96	4.33
Disk Bead	12.62	2.93	3.70
Disk Bead	17.39	2.62	3.70
Disk Bead	14.42	5.86	4.63
Disk Bead	15.63	4.83	5.54
Disk Bead	15.30	3.18	3.78
Disk Bead	10.31	4.32	4.43
Disk Bead	11.62	2.67	4.04
Disk Bead	15.57	4.85	3.63
Disk Bead	21.33	6.34	5.01
Disk Bead	20.36	6.11	4.95
Disk Bead	12.55	5.78	4.70
Disk Bead	13.45	4.20	3.70

Disk Bead	13.44	3.05	4.06
Disk Bead	14.99	5.02	4.16
Disk Bead	14.12	6.08	5.66
Disk Bead	11.44	3.49	4.02
Disk Bead	17.99	3.05	4.05
Disk Bead	13.25	4.45	4.79
Disk Bead	11.09	5.21	3.37
Disk Bead	9.27	5.23	3.86
Disk Bead	15.35	4.21	2.70
Disk Bead	16.52	4.78	4.02
Disk Bead	14.73	4.94	3.75
Disk Bead	14.55	4.70	3.80
Disk Bead	10.05	3.04	3.59
Disk Bead	12.87	2.15	3.36
Disk Bead	13.26	4.47	3.75
Disk Bead	11.63	4.26	4.20
Disk Bead	11.99	3.35	4.70
Disk Bead	8.28	2.05	3.01
Disk Bead	9.50	3.88	3.69
Disk Bead	8.57	2.51	3.03
Disk Bead	8.52	2.16	3.08
Disk Bead	15.71	6.13	4.97
Disk Bead	15.96	2.26	2.81
Disk Bead	18.10	4.45	4.00
Disk Bead	14.57	3.72	2.79
Disk Bead	13.31	4.42	3.13
Disk Bead	17.80	2.74	3.24
Disk Bead	10.68	4.92	4.74
Disk Bead	10.73	2.24	3.45
Disk Bead	10.12	1.98	2.69
Disk Bead	16.08	7.94	5.02
Disk Bead	15.95	4.83	4.09
Disk Bead	13.71	2.14	3.69
Disk Bead	15.71	2.89	3.45
Disk Bead	21.72	4.21	2.78
Disk Bead	8.31	4.55	3.60
Disk Bead	13.39	3.18	3.81
Disk Bead	12.99	3.47	2.83
Disk Bead	11.27	4.27	4.76
Disk Bead	12.51	4.90	4.98
Disk Bead	9.90	3.22	2.97
Disk Bead	12.31	3.44	3.34
Disk Bead	13.07	4.70	3.21
Disk Bead	12.73	3.83	4.38
Disk Bead	9.74	2.18	2.95
Disk Bead	18.78	3.59	3.43
Disk Bead	14.61	3.98	4.93
Disk Bead	12.50	3.08	3.11

Disk Bead	10.26	5.69	3.46
Disk Bead	12.98	2.93	2.78
Disk Bead	10.51	3.48	3.43
Disk Bead	12.26	2.52	2.54
Disk Bead	8.91	3.54	3.94
Disk Bead	14.43	3.08	3.90
Disk Bead	12.57	3.90	3.78
Disk Bead	8.99	2.56	2.54
Disk Bead	9.64	3.37	2.85
Disk Bead	8.60	3.97	2.76
Disk Bead	20.24	4.08	4.64
Disk Bead	15.97	5.73	5.08
Disk Bead	15.16	2.96	4.34
Disk Bead	19.72	4.06	3.82
Disk Bead	13.46	4.65	3.16
Disk Bead	12.50	2.85	3.20
Disk Bead	14.37	3.26	4.08
Disk Bead	11.69	2.95	3.75
Disk Bead	14.57	3.09	3.70
Disk Bead	11.85	3.19	3.71
Disk Bead	13.65	3.47	3.06
Disk Bead	17.06	5.08	4.55
Disk Bead	20.47	4.32	4.03
Disk Bead	22.38	4.87	3.90
Disk Bead	21.12	5.99	3.90
Disk Bead	12.43	3.54	3.51
Disk Bead	19.10	3.14	3.82
Disk Bead	21.86	6.74	5.56
Disk Bead	21.81	3.44	3.92
Disk Bead	24.08	6.22	4.08
Disk Bead	26.61	3.02	3.74
Disk Bead	16.51	4.45	4.25
Disk Bead	19.58	2.50	5.56
Disk Bead	17.41	3.37	4.17
Disk Bead	18.90	6.11	3.45
Disk Bead	18.71	3.55	3.72
Disk Bead	17.82	2.72	3.62
Disk Bead	17.10	4.00	3.84
Disk Bead	15.86	5.19	4.27
Disk Bead	12.31	5.64	4.51
Disk Bead	12.74	4.71	3.87
Disk Bead	15.91	2.91	3.56
Disk Bead	12.65	2.71	2.57
Disk Bead	17.57	4.96	4.65
Disk Bead	29.17	8.15	3.67
Disk Bead	22.42	5.07	4.72
Disk Bead	18.69	3.29	3.25
Disk Bead	16.69	3.86	3.75

Disk Bead	18.52	5.22	6.79
Disk Bead	17.10	5.87	4.76
Disk Bead	14.96	4.60	3.86
Disk Bead	16.82	3.70	4.28
Disk Bead	19.03	4.65	3.72
Disk Bead	12.06	3.37	4.35
Disk Bead	15.95	4.43	4.67
Disk Bead	13.21	4.07	3.18
Disk Bead	14.50	3.77	4.60
Disk Bead	21.09	3.23	3.39
Disk Bead	11.64	5.64	3.66
Disk Bead	12.39	3.91	3.82
Disk Bead	15.23	3.80	4.12
Disk Bead	12.16	3.19	4.84
Disk Bead	14.74	6.31	4.99
Disk Bead	11.10	3.97	3.54
Disk Bead	12.00	3.65	3.57
Disk Bead	11.32	3.92	4.92
Disk Bead	10.32	3.63	3.32
Disk Bead	10.50	2.46	3.33
Disk Bead	8.04	3.57	3.00
Disk Bead	10.15	2.46	4.30
Disk Bead	9.13	3.53	2.49
Disk Bead	11.40	2.75	3.33
Disk Bead	8.42	3.39	2.79
Disk Bead	8.96	3.23	2.58
Disk Bead	12.02	3.22	3.32
Disk Bead	7.97	3.29	3.85
Disk Bead	12.27	3.33	3.33
Disk Bead	10.96	2.35	2.75
Disk Bead	8.68	3.75	3.28
Disk Bead	7.59	2.52	2.73
Disk Bead	6.93	4.00	2.89
Disk Bead	9.72	2.84	3.63
Disk Bead	8.23	3.00	2.68
Disk Bead	17.58	6.75	4.95
Disk Bead	26.04	3.36	3.67
Disk Bead	26.82	3.35	3.63
Disk Bead	24.59	2.80	3.71
Disk Bead	18.17	2.84	3.45
Disk Bead	13.75	4.55	4.45
Disk Bead	23.29	3.76	3.85
Disk Bead	9.35	4.43	2.71
Disk Bead	15.05	3.26	4.45
Disk Bead	16.73	4.85	5.26
Disk Bead	13.30	4.23	4.05
Disk Bead	11.96	2.81	3.96
Disk Bead	15.71	4.24	4.40

Disk Bead	11.54	2.83	3.32
Disk Bead	10.94	5.41	3.96
Disk Bead	14.27	4.23	4.19
Disk Bead	10.79	3.06	4.55
Disk Bead	10.16	5.64	4.19
Disk Bead	16.79	5.55	4.71
Disk Bead	15.20	6.66	4.37
Disk Bead	13.14	4.72	3.00
Disk Bead	17.59	6.32	3.17
Disk Bead	20.35	3.83	3.34
Disk Bead	18.47	5.70	3.62
Disk Bead	19.96	5.65	6.00
Disk Bead	10.32	3.21	3.81
Disk Bead	11.13	4.00	4.71
Disk Bead	13.93	2.44	3.44
Disk Bead	15.22	3.76	2.97
Disk Bead	14.53	2.94	3.36
Disk Bead	10.75	5.44	3.38
Disk Bead	14.68	8.18	3.57
Disk Bead	15.31	3.37	3.32
Disk Bead	11.84	4.13	3.21
Disk Bead	15.39	4.28	4.51
Disk Bead	11.17	4.07	4.98
Disk Bead	10.97	4.06	3.75
Disk Bead	16.42	2.59	2.72
Disk Bead	10.67	4.23	3.67
Disk Bead	27.04	5.56	4.97
Disk Bead	12.55	3.29	2.89
Disk Bead	15.41	2.81	3.78
Disk Bead	15.15	4.26	4.08
Disk Bead	21.52	4.39	4.24
Disk Bead	11.78	4.16	3.88
Disk Bead	14.35	3.96	4.02
Disk Bead	15.41	2.87	3.74
Disk Bead	13.23	4.57	4.30
Disk Bead	11.10	4.29	3.74
Disk Bead	11.59	2.57	2.68
Disk Bead	12.58	2.63	3.20
Disk Bead	11.40	3.22	3.52
Disk Bead	12.36	2.72	3.26
Disk Bead	12.91	3.92	4.00
Disk Bead	9.42	2.97	2.95
Disk Bead	27.64	6.18	4.22
Disk Bead	18.54	2.87	2.95
Disk Bead	19.89	2.68	4.39
Disk Bead	25.41	2.99	4.81
Disk Bead	16.52	5.16	3.14
Disk Bead	15.09	2.91	2.88

Disk Bead	9.49	3.09	3.01
Disk Bead	13.07	2.04	2.88
Disk Bead	11.62	2.48	2.56
Disk Bead	7.06	5.00	2.82
Disk Bead	8.84	2.85	2.80
Disk Bead	42.35	9.18	3.75
Disk Bead	23.63	4.73	4.21
Disk Bead	24.95	9.29	6.17
Disk Bead	35.14	4.14	3.52
Disk Bead	24.23	5.94	3.96
Disk Bead	19.74	4.63	3.62
Disk Bead	15.47	5.52	3.30
Disk Bead	15.99	3.25	4.64
Disk Bead	17.57	5.33	3.79
Disk Bead	17.28	3.92	3.97
Disk Bead	18.21	8.61	4.92
Disk Bead	13.76	4.73	3.78
Disk Bead	18.30	3.57	2.38
Disk Bead	12.13	4.38	2.94
Disk Bead	10.63	3.48	3.10
Disk Bead	11.59	5.69	4.09
Disk Bead	11.75	3.72	3.37
Disk Bead	30.20	7.16	4.58
Disk Bead	26.60	9.61	5.83
Disk Bead	31.25	5.46	3.59
Disk Bead	25.17	4.67	5.36
Disk Bead	31.13	4.47	3.76
Disk Bead	17.93	4.15	3.49
Disk Bead	20.10	3.75	3.61
Disk Bead	11.62	5.79	3.84
Disk Bead	19.26	5.44	2.98
Disk Bead	14.30	3.29	3.50
Disk Bead	13.96	4.26	2.43
Disk Bead	13.01	4.35	3.59
Disk Bead	19.88	6.55	3.25
Disk Bead	15.29	6.16	3.16
Disk Bead	12.25	4.73	3.85
Disk Bead	20.53	3.91	4.33
Disk Bead	15.14	8.16	4.12
Disk Bead	12.68	5.39	4.06
Disk Bead	9.85	3.85	2.12
Disk Bead	12.14	4.41	3.19
Disk Bead	13.92	3.02	4.79
Disk Bead	10.61	3.93	3.72
Disk Bead	23.58	5.46	5.55
AVERAGES (mm)	**14.79**	**4.42**	**4.12**

Broken or incomplete beads were not measured and are not included in these size averages

Total beads 778

APPENDIX B: WILSON MOUND PHOTOGRAPHS

Figure B.1 Wilson Mound Gumbo Remnant

Figure B.2 Preston Holder at Wilson Mound

Figure B.3 Joyce Wike at Wilson Mound

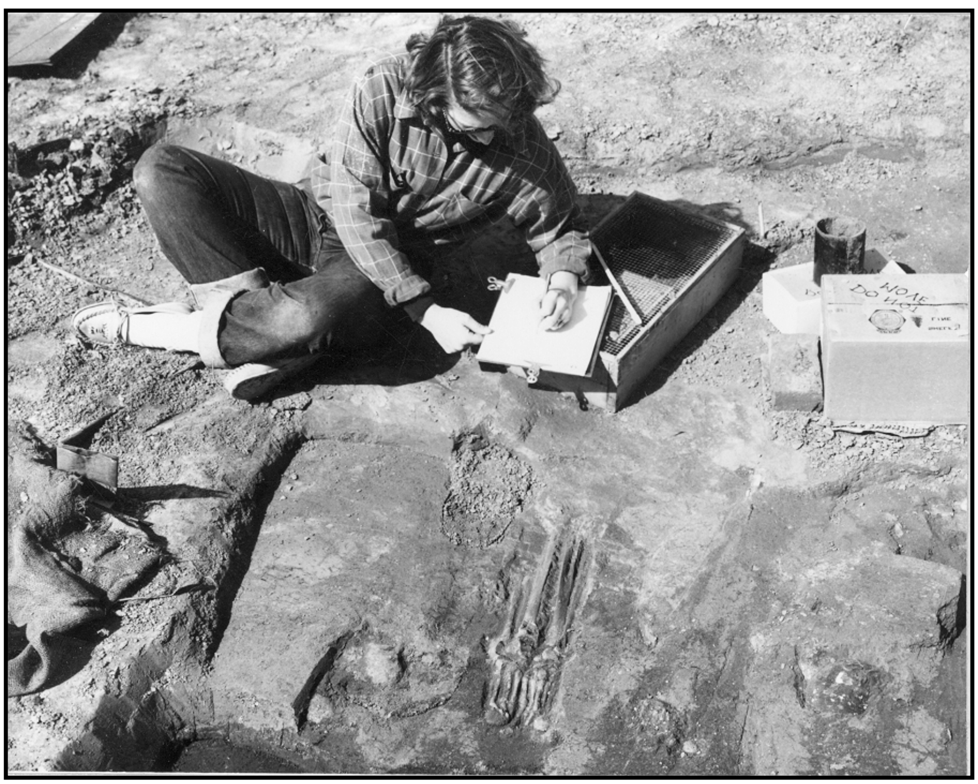

Figure B.4 Joyce Wike excavating Burial Complex #3

Figure B.5 Excavations of Wilson Mound

Figure B.6 Profile Pit #1

Figure B.7 Excavation of Submound Pit

Figure B.8 Preston Holder excavating Burial Complex #3

Figure B.9 Wilson Mound Human Remains, Burial Complex #3

Figure B.10 Bundle #15, Burial Complex #3

Figure B.11 Primary Burial #5, Burial Complex #3

Figure B.12 Wilson Mound unidentified profile